State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

APPENDICES

FOR THE

Ambient Air Monitoring for Methyl Bromide and 1,3-Dichloropropene in Monterey and Santa Cruz Counties – Fall 2001

Operations Planning and Assessment Section
Quality Management Branch
Monitoring and Laboratory Division

Project No. P-01-004

Date: March 28, 2002

Ambient Air Monitoring for
Methyl Bromide and 1,3-Dichloropropene
in Monterey and Santa Cruz Counties – Fall 2001

APPENDICES

APPENDIX I

MONITORING PROTOCOL

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

Protocol for the Ambient Air Monitoring for Methyl Bromide, 1,3-Dichloropropene, Chloropicrin and Breakdown Products of Metam Sodium In Kern, Monterey and Santa Cruz Counties *During Summer/Fall, 2001*

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This protocol has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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In Kern, Monterey and Santa Cruz Counties
During Summer/Fall, 2001

I. Introduction

At the request of the California Department of Pesticide Regulation (DPR) (June 28, 2000 Memorandum, Helliker to Lloyd), the Air Resources Board (ARB) staff will conduct ambient air monitoring for the pesticides methyl bromide, 1,3-dichloropropene (Telone), chloropicrin and two breakdown products of metam sodium (methyl isothiocyanate and methyl isocyanate). Monitoring will occur in Kern County over an eight week ambient monitoring period, tentatively scheduled from June 30, 2001 to August 30, 2001 and also in Monterey and Santa Cruz Counties over an eight week ambient monitoring period, tentatively scheduled from September 10, 2001 to November 8, 2001. This is the second consecutive year the DPR has requested monitoring for methyl bromide and 1,3-dichloropropene at these locations. This monitoring will be done to fulfill the requirements of AB 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5) which requires the ARB "to document the level of airborne emissions...of pesticides which may be determined to pose a present or potential hazard..." when requested by the DPR. Monitoring is being conducted to coincide with the primary use of these fumigants prior to planting carrots in Kern County and prior to planting strawberries in Monterey and Santa Cruz Counties.

The sampling and analysis will follow the procedures outlined in this protocol as well as the quality assurance guidelines described in the "Quality Assurance Plan for Pesticide Air Monitoring" (May 11, 1999 version)(Attachment I).

The draft method, "Standard Operating Procedures for the Sampling and Analysis of Bromomethane and Telone by GC/MS using a Varian Cryogenic Sampler and Silco™ Canisters," is included as Attachment II (May 2001 Version). This method will be used as the primary analysis method for methyl bromide (bromomethane) and 1,3-dichloropropene. Samples with concentrations above the calibration range of the primary method will be analyzed on a secondary method, "Standard Operating Procedure Sampling and Analysis of Bromomethane In Silco Canisters", included as Attachment III.

The draft ARB method, "Standard Operating Procedure, Sampling and Analysis of 1,3-dichloropropene (Telone) and Methyl Isothiocyanate (MITC) in Application and Ambient Air using Gas Chromatography/Mass Selective Detector (06/25/01 Version)," is enclosed as Attachment IV.

The draft ARB method, "Standard Operating Procedure, Sampling and Analysis of

Methyl Isocyanate in Application and Ambient Air using High Performance Liquid Chromatography with a Fluorescence Detector (06/25/01 Version)," is enclosed as Attachment V.

The draft ARB method, "Standard Operating Procedure, Sampling and Analysis of Trichloronitromethane (Chloropicrin) in Application and Ambient Air using Gas Chromatography/Mass Selective Detector (06/25/01 Version)," is enclosed as Attachment VI.

II. Sampling

The collection media used for monitoring of methyl bromide and 1,3-dichloropropene will involve Silcosteel® canister sampling. The media used for chloropicrin will be *XAD-4* sampling cartridges. The media used for methyl isocyanate (MIC) will be *XAD-7* sampling cartridges. The media used for methyl isothiocyanate (MITC) will be charcoal sampling cartridges (1,3-dichloropropene results from the charcoal samples will also be reported). Individual samples will be collected for 24-hour periods. For pesticide ambient monitoring conducted in 2000, 24-hour samples were collected four days per week, Monday through Friday. However, for the 2001 monitoring the DPR has requested that: "At each site, 4 samples per week should be collected randomly over the full seven-day week during the sampling period". To accommodate this request the sampling schedule will be arranged, generally in groups of four consecutive sampling periods separated by one, two or three off-days, to add sampling days during most of the weekends during the eight week monitoring studies.

Caution should be used during field monitoring, transportation, storage, and lab analysis to minimize exposure of samples to sunlight in order to prevent photo degradation of chloropicrin, MIC and MITC.

Chloropicrin, MIC and MITC Sampling:

The sampling methods for three of the compounds require passing measured quantities of ambient air through adsorbent sampling tubes. For chloropicrin, the tubes are 8 mm x 150 mm, XAD-4, with 400 mg in the primary section, and 200 mg in the secondary section (SKC special order). For MIC, the tubes are 6 mm x 90 mm, XAD-7, 1-(2-pyridyl)piperazine coated, with 80 mg in the primary section, and 40 mg in the secondary section (Supelco special order). Two tubes will be used in sequence for the MIC sampling. For MITC, the tubes are 8 mm x 110 mm, coconut shell charcoal with 400 mg in the primary section, and 200 mg in the secondary section (SKC catalogue #226-09). (The coconut base charcoal tube samples will also be analyzed for 1,3-dichloropropene to be compared with the canister results).

Sample collection for chloropicrin is at a flow rate of 90 standard cubic centimeters per

minute (sccpm); at 75 sccpm for MIC; and at 2.5 standard liters per minute (slpm) for MITC. All samples are 24 hours in duration. Subsequent to sampling, the tubes are capped, labeled, placed in a culture tube and stored and transported to the ARB laboratory in Sacramento in an insulated container with dry ice. The DPR recommended target 24-hour estimated quantitation limits (EQLs) were 0.1 ug/m^3, 0.05 ug/m^3 and 0.5 ug/m^3 for chloropicrin, MIC, and MITC, respectively. The ARB 24-hour EQLs are 0.15 ug/m^3, 0.42 ug/m^3 and 0.18 ug/m^3 for chloropicrin, MIC, and MITC, respectively. The MIC EQL is approximately 8 times higher than requested. The DPR directed that the monitoring for MIC should be conducted as planned even with the higher than requested quantitation limit.

Each sample train consists of an adsorbent tube, Teflon fittings and tubing, rain/sun shield, rotameter, train support and a 115 volt AC vacuum pump (Figure 1). Tubes are prepared for use by breaking off the sealed glass end and immediately inserting the tube into the Teflon fitting. The tubes are oriented in the sample train according to a small arrow printed on the side indicating the direction of flow. A 0-5 lpm rotameter is used to control sample flow for the MITC sampling and 0-240 ccpm rotameters will be used to control the flow for the chloropicrin and MIC sampling. The flow rates will be set using a calibrated digital mass flow meter (MFM) before the start of each sampling period. A MFM scaled from 0-5 slpm is used for MITC and a 0-100 sccpm MFM is used for the chloropicrin and MIC samplers. The flow rate is also checked and recorded, using the MFM, at the end of each sampling period. Samplers will be leak checked prior to each sampling period with the sampling tubes installed. Any change in flow rates will be recorded in the field logbook. The pesticide ambient sampling procedures for adsorbent tubes are attached as Attachment VIII. The adsorbent tube sampling field log sheet is enclosed as Attachment X.

Methyl Bromide (MeBr) and 1,3-Dichloropropene Sampling

Integrated ambient air samples will be collected using passive air sampling into evacuated six liter, Silcosteel® canisters (from Restec Corporation). The flow rate of 3 sccpm will be set using a battery operated mass flow meter. The sampling system will be operated continuously for 24 hours with the exact operating interval recorded on the log and field data sheets (see Attachment IX). The canister vacuum reading will be recorded at the start and end of each sampling period using the –30 to 0 inHg gauge on the passive sampler. The start and end canister vacuum readings will be approximately -30 inHg and -8 inHg, respectively. The canister vacuum reading will also be measured using a more accurate gauge in the lab before and after transport to/from the field. The laboratory gauge readings will be used to calculate the sample volume collected. The 3 sccpm sampling rate will yield a sample volume of 4.32 liters over the 24 hour sampling period. The EQL for MeBr is 0.036 ug/m^3 (target EQL was 0.4 ug/m^3) and the EQLs for cis and trans 1,3-dichloropropene are 0.015 and 0.03 ug/m^3, respectively (target EQL for Telone was 0.01 ug/m^3).

The critical orifice flow controllers (Silcosteel treated Veriflo SC423XL) will be attached to the valve fitting on the canister using a Silcosteel treated swagelock connector (Figure 2). A six foot section of 1/8 inch O.D, Silcosteel tubing will be attached to the inlet end of an in-line, 7 micron filter, which will be attached to the inlet end of the flow controller. The inlet end of the tubing will be bent into a U shape (to prevent rain from entering) and supported about six feet above the building roof tops for the ambient monitoring. At the end of each sampling period, the canisters will be placed in shipping containers, with a sample identification/chain of custody sheet, and will be shipped as soon as reasonably possible to the ARB Monitoring and Laboratory Division laboratory for analysis. The samples will be stored at ambient laboratory temperature prior to analysis.

When using a critical orifice flow restrictor for passive integrated sampling, the potential decrease in flow rate as the vacuum in the canister changes must be taken into account. This condition is resolved by using the Veriflo SC423XL flow controller. The controller uses a metal diaphram downstream of the critical orifice to regulate the flow as the pressure the canister changes. It is capable of maintaining a continuous low flow with vacuum ranges from -29.9 to approximately -5 inHg. The in-line filter prevents particles from entering the critical orifice of the flow controller, which could clog the critical orifice and affect the flow through the controller. The outside temperature can also affect the flow rate. For example, there could be an approximately six percent flow drop when the temperature changes from 80 °F to 125 °F (according to manufacturer's specifications).

The pesticide ambient sampling procedures for canisters are enclosed as Attachment VII. The canister sampling field log sheet and canister data sheet are enclosed as Attachment IX. These forms will be used to record start and stop times, start and stop vacuum readings, sample identifications, weather conditions, sampler's initials and any other significant data.

Ambient Monitoring

The DPR has directed that monitoring site selection in Kern County should focus on 1,3-dichloropropene and metam sodium, but that samples be collected and analyzed for all five compounds. The historical use patterns for 1,3-dichloropropene and metam sodium suggest that monitoring should occur over a two-month period during July and August in Kern County. As was done in 2000, five sampling sites will be selected in relatively high-population areas or in areas frequented by people. At each site, a target of 32 discrete 24-hour sampling periods will be monitored during the study. Collocated (field duplicate) samples will be collected for 1 day/week at each sampling location.

The DPR has directed that monitoring site selection in Monterey and Santa Cruz Counties should focus on methyl bromide and chloropicrin, but that samples be collected and analyzed for all five compounds. In Monterey and Santa Cruz Counties,

historical use patterns indicate that monitoring for methyl bromide and chloropicrin should take place during September and October. As was done in 2000, five sampling sites will be selected in relatively high-population areas or in areas frequented by people (e.g., schools or school district offices, fire stations or other public buildings). Also, samples will again be collected in an urban area in Salinas. At each site, a target of 32 discrete 24-hour samples will be taken during the sampling period. Collocated (duplicate) samples will be collected for eight dates at each sampling location. Samples will also be collected for a one-week period in an area which is distant to fumigant applications. The location of this 'background' sampling site will be determined after consultation with the County Agricultural Commissioner's offices.

The sites were selected by ARB personnel from the areas of Kern County where carrot (and roses for one site) farming is predominant and from areas of Monterey and Santa Cruz Counties where strawberry farming is predominant. Sites were selected for their proximity to the fields and the presence of residents or students, with considerations for both accessibility and security of the sampling equipment. The sites are near areas of historical use of methyl bromide, 1,3-dichloropropene, chloropicrin and metam sodium. ARB understands that DPR staff will verify and quantify the actual use of these fumigants that takes place during the study when the information becomes available.

III. Analysis

The draft method, "Standard Operating Procedures for the Sampling and Analysis of Bromomethane and Telone by GC/MS using a Varian Cryogenic Sampler and Silco™ Canisters," is included as Attachment II (May 2001 Version). This method will be used as the primary analysis method for methyl bromide (bromomethane) and 1,3-dichloropropene. Samples with concentrations above the calibration range of the primary method will be analyzed on a secondary method, "Standard Operating Procedure Sampling and Analysis of Bromomethane In Silco Canisters" (Attachment III), using a higher calibration range. The procedures are based on EPA Method TO-15 and consist of cryogenic pre-concentration of an aliquot of the whole air sample followed by GC/MS analysis. The canisters arrive from the field at sub-ambient pressure and are pressurized (diluted) in the laboratory before analysis. The analyses will be performed by the ARB laboratory in Sacramento.

The ARB method, "Standard Operating Procedure, Sampling and Analysis of 1,3-dichloropropene (Telone) and Methyl Isothiocyanate (MITC) in Application and Ambient Air using Gas Chromatography/Mass Selective Detector (06/25/00 Version)," is enclosed as Attachment IV. The exposed charcoal tubes are stored in an ice chest or refrigerator until desorbed with 3 ml of dichloromethane. The attached SOP specifies that a gas chromatograph with a mass selective detector is used for analysis. The analyses will be performed by the ARB laboratory in Sacramento.

The draft ARB method, "Standard Operating Procedure, Sampling and Analysis of Methyl Isocyanate in Application and Ambient Air using High Performance Liquid Chromatography with a Fluorescence Detector (06/25/01 Version)," is enclosed as Attachment V. As outlined in the SOP, the sampling efficiency/recovery is low using this method, ranging from 50% to 70% at low levels. The sampling stability study will be run concurrently with analyses of samples. The analyses will be performed by the ARB laboratory in Sacramento.

The draft ARB method, "Standard Operating Procedure, Sampling and Analysis of Trichloronitromethane (Chloropicrin) in Application and Ambient Air using Gas Chromatography/Mass Selective Detector (06/25/01 Version)," is enclosed as Attachment VI. The analyses will be performed by the ARB laboratory in Sacramento.

IV. Quality Assurance

Field Quality Control for the ambient monitoring will include the following for each of the sampling methods (and for each of the sampling regions).

1) Field Spikes: For the 2000 ambient monitoring, field spikes were prepared (spiked) at approximately 0.6 ug/m^3 for both methyl bromide and 1,3-dichloropropene. The 2000 field spikes were collocated with samples collected at the urban sampling sites of Bakersfield and Salinas for the two respective studies. However, the pesticide levels observed in the collocated ambient samples were significantly higher than the spike levels, causing poor results in the recovery calculation. For 2001, the field spikes will be prepared (spiked) at levels of approximately 10 ug/m^3 each for methyl bromide and cis and trans 1,3-dichloropropene in the canister samples.

   The spike levels for MIC, MITC and chloropicrin in the adsorbent tube samples have not yet been determined.

   The four field spikes will be obtained by sampling ambient air at the urban background monitoring site for 24 hour periods (i.e., collocated with a background sample at the same environmental and experimental conditions). The four field spikes will be collected over the eight-week monitoring period. For example, one each of the field spikes will be collected every other week.

   For the 2001 Monterey/Santa Cruz Counties study, a field spike sample will also be collected at a site (to-be-determined) distant to methyl bromide applications. Levels of methyl bromide at this 'background' site are expected to be lower than in Salinas.

2) Four trip spikes will be prepared at the same level as the field spikes. A trip spike will be transported and analyzed along with each of the field spikes.

3) Four lab spikes will be prepared at the same level as the field and trip spikes. A lab spike will be analyzed along with each of the field and trip spike sets.

4) Collocated samples will be taken for eight dates at each sampling location.

5) A trip blank will be obtained each week of sampling.

V. Personnel

ARB sampling personnel will consist of staff from the ARB Air Quality Surveillance Branch. Laboratory personnel will consist of staff from the ARB Northern Laboratory Branch.

FIGURE 1. SAMPLE TREE

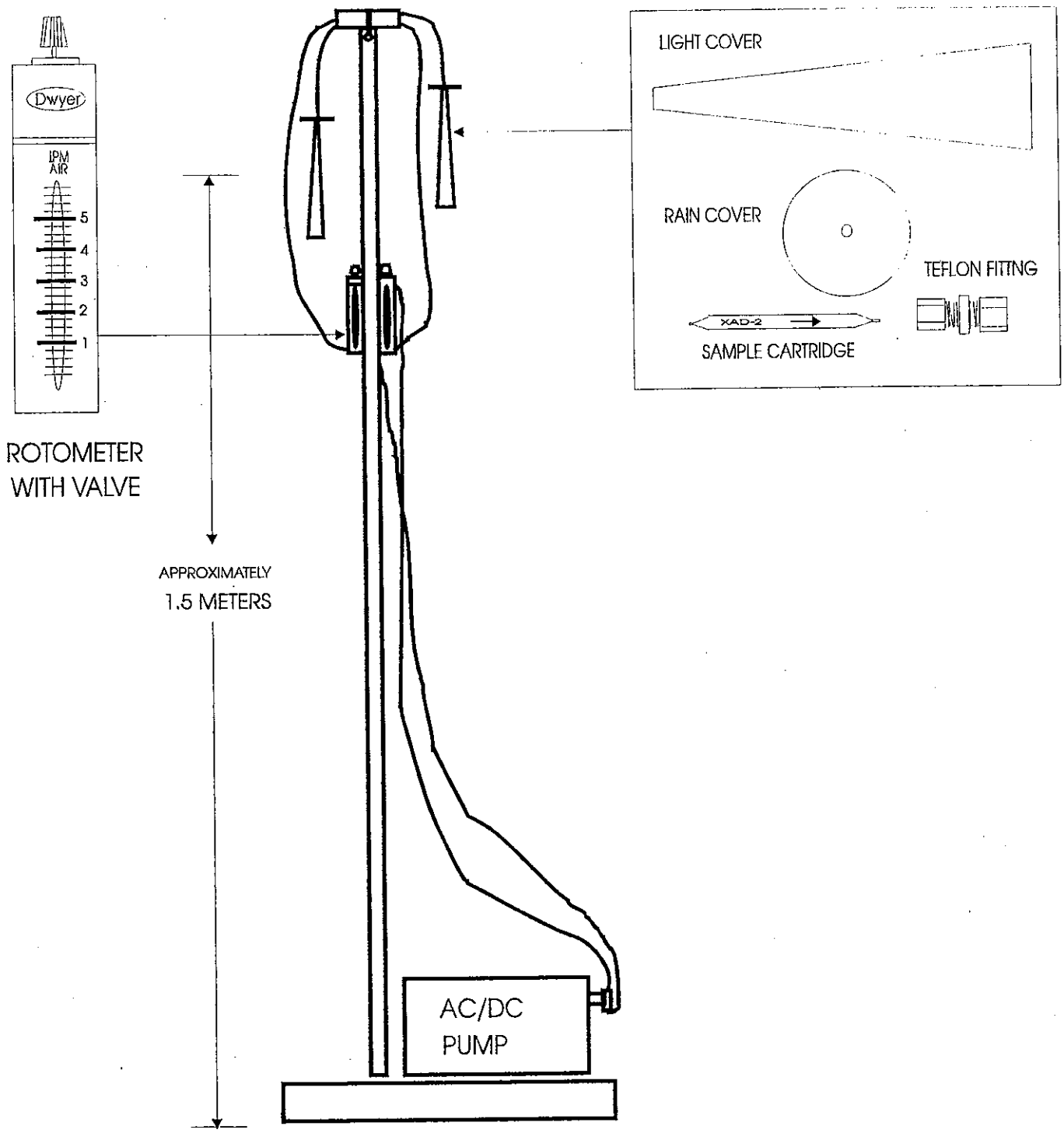
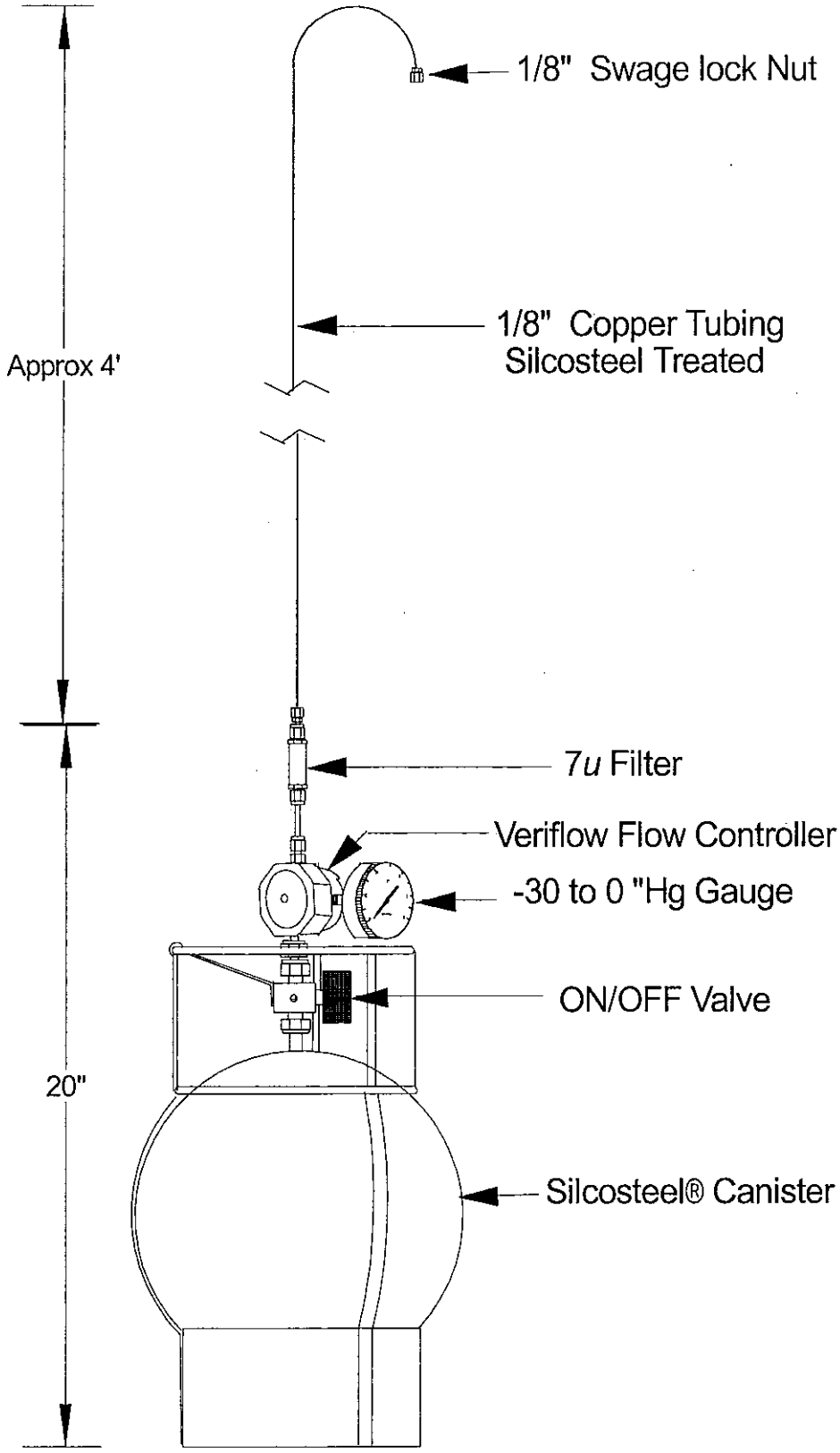


Figure 2

Passive Canister Sampling Train



APPENDIX II

CANISTER SAMPLE LABORATORY REPORT

California Environmental Protection Agency

Air Resources Board

Bromomethane and 1,3-Dichloropropene Method Development and Analytical Results for Monterey and Santa Cruz Counties Ambient Air Monitoring Samples Collected in Six-liter Silco™ Canisters

DATE: March 26, 2002
Revision 2

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1.0 INTRODUCTION

The Department of Pesticide Regulation (DPR) requested the Air Resources Board (ARB) to conduct ambient air monitoring for bromomethane and 1,3-dichloropropene (Telone) using six-liter Silco™ canisters for sample collection. 1,3-Dichloropropene is a mixture of two isomers, cis-1,3-dichloropropene and trans-1,3-dichloropropene, and both isomers are quantified separately in this report. ARB staff analyzed ambient air samples collected during an eight-week period at six Monterey and Santa Cruz County monitoring sites. This report covers the analytical and quality assurance results for this ambient air-monitoring program. The standard operating procedure (SOP) for the analysis of bromomethane and 1,3-dichloropropene is attached as Appendix 1.

2.0 METHOD DEVELOPMENT AND STANDARD OPERATING PROCEDURE

2.1 Overview

The method follows U. S. Environmental Protection Agency (USEPA) Compendium Method TO-15. Each field sample is pressurized to approximately 5 pounds per square inch gauge (psig) before sample analysis. The canister samples are concentrated using a cryogenic autosampler/concentrator (cryosampler) and then loaded onto the capillary column. The cryosampler contains a Nafion dryer, which reduces water vapor in the sample stream. A gas chromatograph equipped with a high-resolution capillary column separates the sample components. A linear quadrapole mass spectrometer operated in selected ion monitoring (SIM) mode detects the sample components. The results of the analysis are calculated using an internal standard (IS) method with separate internal standards for bromomethane and 1,3-dichloropropene

2.2 Instrument Reproducibility

In order to establish the reproducibility of this method, lab staff prepared three spiked standard mixtures of bromomethane and 1,3-dichloropropene. Lab staff analyzed each standard concentration five times using a 400-milliliter (ml) sample size. Table 1 shows the instrument reproducibility results for bromomethane and 1,3-dichloropropene obtained from instrument MSD-4. Since both instruments had the same configuration, a three level reproducibility study was not performed for MSD-3. Instead, a low level replicate analysis (method detection limit) was performed on MSD-3 for bromomethane at the end of the Monterey sampling program. The results for bromomethane when spiked at 1.32 $\mu g/m^3$ resulted in an average recovery of 93.18 % with a 3.59% standard deviation.

2.3 Calibration

The gas chromatograph is calibrated by an internal standard (IS) method. A calibration curve is constructed by linear regression analysis of calibrator to IS response ratios. The high point of the calibration is determined by sampling 400 ml of a canister containing the high point concentration. Subsequent calibration points are determined by injecting smaller amounts from the high calibrator canister. The subsequent calibration points

volumes are 200, 100, 50, 25 and 15 ml. Calibration curves used for the current study had an r^2 value (variance) equal to or greater than 0.99. The instrument is calibrated whenever the continuing calibration check is not within 20% of it's target value or the Laboratory Control Sample (LCS) is not within control limits.

2.4. Minimum Detection Limit (MDL)

This method follows standard United States Environmental Protection Agency (USEPA) procedures to calculate the MDL. Using the analysis of seven low-level matrix spikes the MDL and EQL for a 400-ml sample are calculated as follows:

s = the standard deviation of the concentration calculated for the seven replicate spikes.

For bromomethane: s = 1.5 ng/m^3
MDL = (3.14)*(s) = (3.14) *(1.5) = 4.7 ng/m^3
EQL = (5)*(MDL) = (5) *(4.7) = 24 ng/m^3
Assume 1:1.5 dilution for pressurization of sample; EQL=24 ng/m^3 * 1.5 = 36 ng/m^3

For cis-1,3-dichloropropene: s = 1.9 ng/m^3
MDL = (3.14)*(s) = (3.14) *(1.9) = 5.8 ng/m^3
EQL = (5)*(MDL) = (5) *(5.8) = 29 ng/m^3
Assume 1:1.5 dilution for pressurization of sample; EQL=29 ng/m^3 * 1.5 = 44 ng/m^3

For trans-1,3-dichloropropene: s = 2.7 ng/m^3
MDL = (3.14)*(s) = (3.14) *(2.7) = 8.5 ng/m^3
EQL = (5)*(MDL) = (5) *(8.5) = 43 ng/m^3
Assume 1:1.5 dilution for pressurization of sample; EQL=43 ng/m^3 * 1.5 = 64 ng/m^3

** two decimal places used for calculation, reported to one decimal place*

The dilution factor (1.5) is used to adjust the EQL value to reflect the expected dilution of the field samples. The dilution factor is used to adjust the instrument results to reflect the dilution of the field sample when the canister is pressurized to approximately five (5) psig.

For results above the EQL the lab reports these values to three (3) significant figures. Results below the EQL but greater than or equal to the MDL are reported as detected (DET). If a result is less than MDL it is reported as <MDL.

The requested EQL's for bromomethane and 1,3-dichloropropene were 0.4 and 0.01 μg/m^3 respectively. Based on a 400 ml sample size the EQL's achieved were 0.036 μg/m^3 for bromomethane, 0.044 μg/m^3 for cis-1,3-dichloropropene and 0.064 μg/m^3 for trans-1,3-dichloropropene. The maximum sample size was set at 400 ml based on the increased probability of matrix interference from high levels of sample moisture and matrix. The mass spectrometer was operated using selected ion monitoring (SIM) mode to achieve the highest level of instrument sensitivity. Given the sample size and instrument parameters

the EQL's reported are the best that could be achieved.

2.5. Collection Efficiency (Recovery)

Eight (8) canisters were used to determine method recovery. Lab staff spiked four (4) canisters with standard at a level equivalent to a point within the low calibration range. Lab staff spiked an additional four (4) canisters with standard at a level equivalent to a point within the high calibration range. Using standard sampling conditions, lab staff introduced ambient air into the canisters. Sampling was performed on the sampling platform at ARB 13th & T Sacramento. Lab staff then analyzed the canisters and compared the results to the theoretical (expected) values. See Table 2 for comparison results.

2.6. Storage Stability

Lab staff spiked four (4) canisters with a gas standard at the mid-calibration range and held the canisters under laboratory conditions until analysis. Analysis of the spiked canisters occurred at day 0, 5, 13, and 35. Standard compound stability was evaluated by comparing the ratio of the compound to it's internal standard. See Table 3 for sample stability results.

2.7 Canister Cleaning

Canisters are cleaned in batches of eight (8). Lab staff chooses one of the cleaned canisters for GCMS analysis. Normally, lab staff analyzes the canister with the highest level of target compound. If results for the target compounds are not below method MDL's the entire cleaning batch is recleaned and rechecked. Appendix 2 contains the standard operating procedure for canister cleaning.

3.0 AMBIENT AIR MONITORING SAMPLE RESULTS

The laboratory received 249 ambient air samples from Monterey and Santa Cruz Counties, including seven (7) trip blanks, four (4) trip spikes and four (4) field spikes. Four (4) lab spikes were prepared and held in the laboratory. They were analyzed with their respective field spikes. In addition, four (4) background ambient air samples were collected and analyzed. Sample analysis of field samples occurred within seventeen (17) days of receipt. Table 4 contains the results for the analysis of the bromomethane and 1,3-dichloropropene in ambient air samples. Results for analytical duplicates are reported in Table 5.

Because the concentration of field samples was higher than anticipated, many of the ambient air samples required dilution. Lab staff diluted samples by injecting a volume less than 400 ml. Dilution results were multiplied by the volume ratio (400 ml/volume injected) to calculate the actual concentration. The sample concentrator cannot accurately deliver volumes less than 15 ml, so samples with extremely high concentration of analytes were analyzed on an alternate GC/MS cryosampler system (MSD-3). The alternate system uses the same calibration gas stock standard and internal standard as the primary system

but was calibrated over a higher concentration range.

4.0 ANALYTICAL QUALITY CONTROL

4.1 Laboratory System Blanks

The laboratory system blank checks the analytical system for contamination. A laboratory system blank, which is 400 ml of ultrapure nitrogen, is run before the start of an analytical batch, after every tenth sample and at the end of the analysis sequence. Lab staff defines an analytical batch as the samples in an automated GC/MS analysis sequence.

Several blank values for bromomethane obtained on MSD-4 were between MDL and EQL and were the result of carryover from a high level sample preceding the blank. If the subsequent lab control sample was in range and the subsequent blank was negative, no corrective action was taken. If carryover into a sample was suspected the sample was reanalyzed. All other system blank results for MSD-3 and MSD-4 were less than the MDL.

4.2 Method Calibration

The analytical method uses a certified gas standard for calibration. Before analysis, the detector is autotuned and the results are evaluated using the criteria listed in Appendix 3. The certified standard used for instrument calibration was obtained from Scott Specialty Gases and has the following specifications: bromomethane 13.1ppb, cis-1, 3-dichloropropene 5.05 ppb, trans-1, 3-dichloropropene 4.53 ppb, analytical accuracy +/- 20%, Cylinder # AAL2013. Lab staff prepares working calibration gas by diluting the certified stock standard to produce the calibration curve detailed in Appendix 4.

As mentioned above (Section 2.3), internal standards were used to quantitate both standards and samples. The stock internal standards used for the current project have the following specifications: bromomethane-d3, 102.6 +/- 7.2 ppb, Scott-Marrin Inc. and toluene-d8, 5.93 +/- ppb, Scott Speciality Gases. Working internal standard was prepared by adding the stock bromomethane-d3 standard to a six-liter canister and pressurizing the canister to 29.4 psig with toluene-d8 stock gas. The final concentration of internal standard was 45.19 $\mu g/m^3$ and 21.1 $\mu g/m^3$ for bromomethane-d_3 and toluene-d_8 on MSD-4, and 194.29 $\mu g/m^3$ and 23.13 $\mu g/m^3$ for bromomethane-d_3 and toluene-d_8 on MSD-3. The cryosampler adds internal standard to the analytical system using a fixed volume sample loop. Calibration of the analytical system occurs with each new batch of working internal standard.

4.3 Laboratory Control Samples

Analysis of a laboratory control sample (LCS) occurs with each analytical batch. The stock standard for LCS preparation should not be the same stock standard used to calibrate the instrument. The certified standard used for the current project was obtained from Scott Specialty Gases and has the following specifications: bromomethane 5.77 ppbv, cis-1, 3-dichloropropene 5.45 ppbv, and trans-1, 3-dichloropropene 5.44 ppbv +/- 20%, cyclinder ALM057764. The LCS is prepared by spiking the stock standard into a

six-liter canister and diluting to a specific concentration with ultrapure nitrogen. A 400-ml LCS sample is analyzed on MSD-4 and a 200-ml LCS sample is analyzed on MSD-3 with each analytical batch. Lab staff used the following acceptance criteria to evaluate the LCS: warning limit = sample mean +/- 2 standard deviations; control limit = sample mean +/- 3 standard deviations. Acceptance ranges used for MSD-4 during the current program are: bromomethane, mean = 132 ng/m^3, standard deviation 5.6 ng/m^3, range 115-149 ng/m^3; cis-1, 3-dichloropropene, mean 154 ng/m^3, standard deviation 8.1 ng/m^3, range 130-178 ng/m^3; trans-1, 3-dichloropropene, mean 141 ng/m^3, standard deviation 8.9 ng/m^3, range 114-168 ng/m^3. Acceptance ranges used for MSD-3 during the current program are: bromomethane, mean = 4.56 μg/m^3, standard deviation 0.72 μg/m^3, range 2.39-6.73 μg/m^3; cis-1, 3-dichloropropene, mean 4.68 μg/m^3, standard deviation 0.63 μg/m^3, range 2.77-6.59 μg/m^3; trans-1, 3-dichloropropene, mean 4.03 μg/m^3, standard deviation 0.51 μg/m^3, range 2.49-5.57 μg/m^3. All LCS results were within the acceptance criteria except for MSD-3 dichloropropene on 9/20/01. Dichloropropene results from MSD-3 on 9/20/01 were not reported. Results of the LCS analyses are tabulated in Table 6.

4.4 Continuing Calibration Verification Standard

Lab staff includes a continuing calibration verification standard (CCV) at the beginning of each analytical batch, after every tenth sample in an analytical sequence and at the end of each analytical batch. The CCV must be within ± 20% of the expected value. If the CCV is outside the ±20% limit, lab staff takes appropriate corrective action, and then reanalyzes the CCV and the affected samples. Calibration of the entire system occurs if the reanalysis of the CCV is outside of acceptance limits. A summary of the average percent recovery and standard deviation for the CCV's run on MSD-3 and MSD-4 is reported in Table 7.

4.5 Laboratory Duplicate Samples

Lab staff analyzed approximately 10% of the ambient air samples as duplicates. Results of these duplicate analyses appear in Table 5.

5.0 AMBIENT AIR FIELD, TRIP, LABORATORY SPIKES AND TRIP BLANKS

Four (4) laboratory spikes, four (4) trip spikes, four (4) field spikes and seven (7) trip blanks were analyzed during the Monterey/Santa Cruz County ambient air program. A set of canisters was spiked approximately every two weeks for the duration of the monitoring program. The lab staff held the lab spikes in the laboratory and analyzed them with their corresponding field spike and trip spike. Spikes were analyzed on both analytical systems (MSD-3 and MSD-4) and trip blanks were analyzed on MSD-4. The stock standard used to prepare the spikes was obtained from Scott Specialty gases and differs from the standard used for instrument calibration and the standard used for the LCS. The spike stock standard had the following specifications: bromomethane 110 ppbv, cis-1, 3-dichloropropene 105 ppbv, trans-1, 3-dichloropropene 110 ppbv +/- 10%, cylinder CT8954.

5.1 Laboratory spikes

Four (4) canisters were spiked and stored at ambient temperature in the laboratory. Table 8 presents the laboratory spike results. The average recovery for MSD-3 was bromomethane 155%, cis-1, 3-dichloropropene 106% and trans-1, 3-dichloropropene 93%. The average recovery for MSD-4 was bromomethane 124%, cis-1, 3-dichloropropene 95% and trans-1, 3-dichloropropene 94%.

5.2 Trip spikes

Four (4) canisters were spiked and taken into the field along with the field sample canisters. The trip spike accompanies field staff to the field and is returned to the laboratory. Trip spikes do not undergo field sampling. Table 8 presents the trip spike results. The average recovery for MSD-3 was: bromomethane 147%, cis-1,3-dichloropropene 103% and trans-1,3-dichloropropene 94%. The average recovery for MSD-4 was: bromomethane 125%, cis-1,3-dichloropropene 96% and trans-1,3-dichloropropene 91%

5.3 Field spikes

Four (4) canisters were spiked and taken into the field along with the field sample canisters. Sampling of the field spikes occurred at the ARB Salinas monitoring site. Introduction of ambient air into the spiked canisters follows the ambient air sampling protocol. The field spike results, reported in Table 8, are corrected for ambient background levels. Subtracting the co-located results from the field spike results gives background corrected results. The average corrected recovery for MSD-3 was bromomethane 154%, cis-1, 3-dichloropropene 96% and trans-1, 3-dichloropropene 86%. The average corrected recovery for MSD-4 was: bromomethane 123%, cis-1, 3-dichloropropene 92% and trans-1, 3-dichloropropene 85%.

The apparent higher recoveries obtained from MSD-3, as observed in the various tables referenced for lab, trip and field spike recovery results, would seem to support an argument for a systematic bias. However, there was good agreement between the two instruments when the calibration standards were run (acceptance criteria was +/-20%). Each instrument performed consistently (reproducibility) as demonstrated by the LCS results (with a warning limit of +/-2 standard deviations and control limit of +/-3 standard deviations) in which neither instrument ever exceeded the limits. The most noticeable difference between the instruments was in the various spike recoveries. It is difficult to identify the factor or factors that contributed to this difference in results between MSD-4 and MSD-3. It could be that there indeed is a positive bias in the performance of MSD-3 relative to MSD-4. It could be a number of small contributing factors. One such possibility is that the spike levels (about 10.5 $\mu g/m^3$), which required running a 15-ml sample aliquot (dilution) on MSD-4 to be within the calibration range (upper level 0.847 $\mu g/m^3$), may have introduced another level of error.

A systematic bias was not seen in the interlab comparison. A lab control, ARB interlab

spike, and EAS interlab spike were analyzed by both MSD-4 and MSD-3. The results for the lab control were 115.32% and 126.53% recovery for MSD-4 and MSD-3, respectively. For the ARB spike, the results were 105.18% and 86.53% recovery for MSD-4 and MSD-3, respectively (note the higher recovery by MSD-4 in this instance). There was good comparison for the EAS interlab spike between MSD-4 and MSD-3, 132.23% and 132.97% recovery, respectively.

Both instruments had spike recoveries that averaged above 100% (124% for MSD-4 and 152% for MSD-3). This indicates that the standard used for spikes gave results higher than those from the standard used for calibration irrespective of the instrument. Even though the standard assignments do not match exactly, each is within its certified concentration criteria based on the average spike recovery from MSD-4.

The sample concentrations were quantified based upon the calibration standard and were not corrected for recovery results from either the LCS or spikes. The values for the spikes are an independent result and are not necessarily reflective of the results obtained from the unspiked samples.

5.4 Trip blanks

The lab received seven trip blank canisters. A trip blank is an evacuated six-liter canister. Trip blank canisters accompany field staff through the sampling process. Field staff return trip blanks and analytical samples to the lab for analysis. The trip blanks are pressurized to approximately five psig with ultrapure nitrogen and analyzed. Table 9 presents the trip blank results.

5.5 Santa Cruz Background

Four (4) canister samples were collected in Santa Cruz County to assess background concentration. The samples were collected and analyzed by ARB. Table 10 contains the results for these samples.

6.0 DISCUSSION

Evaluation of the canister stability data in Table 3 indicates that method analytes are stable under laboratory conditions for at least 35 days. Area ratios were chosen to evaluate the canister stability data because method calibration was changed several times during the duration of the stability study. All field canister samples were analyzed within 17 days of being received in the laboratory.

Many of the air monitoring samples required reanalysis due to high levels of bromomethane. In order to minimize sample dilution and to ensure an adequate supply of canisters for the field sampling, samples were analyzed on a second instrument (MSD-3). MSD-3 was calibrated from approximately 0.8 to 21 $\mu g/m^3$ for bromomethane and approximately 0.31 to 9.9 $\mu g/m^3$ for 1,3-dichloropropene. This calibration range was approximately 26 times higher than the upper calibration point analyzed on MSD-4. MSD-4 was calibrated from approximately 0.032 to 0.847 $\mu g/m^3$ for bromomethane and

approximately 0.013 to 0.382 $\mu g/m^3$ for 1,3-dichloropropene. MSD-4 was calibrated to provide results at or below the EQL. The two instrument calibration ranges which overlapped at the 0.8 $\mu g/m^3$ level would then provide the ability to analyze concentrations from approximately 0.032 to 567 $\mu g/m^3$ without having to perform a secondary dilution of the field sample.

More than 249 field samples were analyzed on MSD-4. Because of required sample dilution, one hundred thirty (130) samples required analysis on MSD-3. Additionally, twenty-nine (29) samples requiring only a modest dilution were reanalyzed on MSD-4. The majority of these dilutions were due to elevated levels of bromomethane. Table 4 summarizes the results for the Monterey program. In Table 4 those results in bold lettering are results obtained from MSD-3. Since all the samples were analyzed on MSD-4, the above calibration range analyses were used to qualitatively evaluate the results obtained on MSD-3. This qualitative evaluation was used to ensure that nothing was wrong with the instrument or the canisters, such as valve leakage or poor instrument sampling. Generally, the results obtained on MSD-3 were higher than those obtained on the undiluted MSD-4 analysis. The lower MSD-4 results are expected since high levels of bromomethane exceed the linear calibration range established for MSD-4. In a small number of analyses the MSD-3 result was much lower than the preliminary result obtained from MSD-4. Staff reviewed all the suspected samples and batch QC for a possible explanation. The entire batch QC for the bromomethane analysis met the SOP control limits. One possible explanation might be as the canister approaches zero psig there is an uneven or incomplete sampling of the canister. MSD-3's autosampler is a passive system and relies on canister pressure to deliver the sample to the concentrator. In all cases, the reported results were within the instrument calibration range

Table 1: Instrument Reproducibility
MSD-4

	Methyl Bromide (ng/m^3)	Cis-1,3-Dichloropropene (ng/m^3)	Trans- 1,3-Dichloropropene (ng/m^3)
Low Level			
1	27.7	13.1	12.0
2	28.4	12.7	10.8
3	28.7	11.7	9.5
4	28.8	11.3	9.7
5	27.8	11.4	10.4
Average	**28.28**	**12.04**	**10.48**
SD	**0.507**	**0.811**	**0.998**
RSD	**1.79**	**6.74**	**9.53**
Medium Level			
1	217.18	117.90	106.15
2	214.26	112.85	103.04
3	210.05	116.24	105.23
4	215.40	108.73	100.18
5	214.77	110.71	101.48
Average	**214.33**	**113.29**	**103.22**
SD	**2.636**	**3.795**	**2.496**
RSD	**1.23**	**3.35**	**2.42**
High Level			
1	827.68	384.94	354.83
2	830.28	387.60	355.24
3	851.19	383.94	357.85
4	853.22	383.33	355.10
5	837.73	412.87	381.48
Average	**840.02**	**390.54**	**360.90**
SD	**11.741**	**12.591**	**11.569**
RSD	**1.40**	**3.22**	**3.21**

Notes:

m^3	Cubic meters
ng	Nanograms
RSD	Relative standard deviation
SD	Standard deviation

TABLE 2: Collection Efficiency Results

Low Range Samples

Canister Number	Bromomethane			Cis-1,3-dichloropropene			Trans-1,3-dichloropropene		
	Expected (ng/m^3)	Actual (ng/m^3)	Recovery (%)	Expected (ng/m^3)	Actual (ng/m^3)	Recovery (%)	Expected (ng/m^3)	Actual (ng/m^3)	Recovery (%)
DPR 1113	111	97	87	123	108	89	123	110	89
DPR 1102	111	136	122	123	101	82	123	104	85
DPR 1053	111	143	129	123	97	79	123	104	85
DPR 1109	111	148	133	123	90	73	123	91	74

High Range Samples

Canister Number	Bromomethane			Cis-1,3-dichloropropene			Trans-1,3-dichloropropene		
	Expected (ng/m^3)	Actual (ng/m^3)	Recovery (%)	Expected (ng/m^3)	Actual (ng/m^3)	Recovery (%)	Expected (ng/m^3)	Actual (ng/m^3)	Recovery (%)
DPR 1052	418	434	104	460	487	106	460	448	97
DPR 1062	418	490	117	460	424	92	460	405	88
DPR 1092	418	456	109	460	398	87	460	409	90
DPR 1065	418	458	110	460	487	106	460	451	98

Note:

Sampled at 13th and T Sacramento on 7/12/00

TABLE 3: Canister Stability

Time (days)	Canister Number	Bromomethane		Cis-1,3-dichloropropene		Trans-1,3-dichloropropene	
		Area analyte/Area Internal Std	Recovery (%)	Area analyte/Area Internal Std	Recovery (%)	Area analyte/Area Internal Std	Recovery (%)
0	DPR1059	2.33	NA	1.66	NA	1.25	NA
	DPR1062	2.23	NA	1.54	NA	1.14	NA
	DPR1104	2.35	NA	1.76	NA	1.32	NA
	DPR1149	2.08	NA	1.39	NA	0.96	NA
5	DPR1059	2.39	103	1.70	102	1.32	106
	DPR1062	2.37	106	1.76	114	1.35	118
	DPR1104	2.43	103	1.62	92	1.26	95
	DPR1149	2.21	106	1.43	103	1.02	106
13	DPR1059	2.61	112	1.74	105	1.40	112
	DPR1062	2.64	118	1.7	110	1.31	115
	DPR1104	2.69	114	1.85	105	1.48	112
	DPR1149	2.34	112	1.40	101	1.04	108
35	DPR1059	2.31	99	1.72	104	1.43	114
	DPR1062	2.26	101	1.63	106	1.26	111
	DPR1104	2.34	100	1.86	106	1.56	118
	DPR1149	2.10	101	1.39	100	1.08	113

Table 4: Monterey/Santa Cruz County Ambient Monitoring Results

Site	Log Number	Sample Identification	Date Received	Date Analyzed	Results (ng/m^3)		
					Bromomethane	Cis-1,3-dichloropropene	Trans-1,3-dichloropropene
CHU	3	CHUC-01	9/11/01	9/12/01	1.29E+03	<MDL	<MDL
	4	CHUC-01C	9/11/01	9/12/01	1.29E+03	<MDL	<MDL
	14	CHUC-02	9/11/01	9/19/01	**3.64E+03**	<MDL	<MDL
	21	CHUC-03	9/13/01	9/18/01	**2.88E+03**	<MDL	<MDL
	27	CHUC-04	9/13/01	9/20/01	**2.89E+03**	<MDL	<MDL
	35	CHUC-05	9/20/01	9/24/01	9.42E+02	DET	DET
	36	CHUC-05C	9/20/01	9/24/01	9.28E+02	<MDL	<MDL
	48	CHUC-06	9/20/01	9/25/01	7.93E+02	<MDL	<MDL
	54	CHUC-07	9/26/01	10/1/01	1.86E+03	DET	4.60E+01
	60	CHUC-08	9/26/01	9/26/01	9.74E+02	DET	DET
	67	CHUC-09	9/26/01	10/1/01	1.28E+03	2.28E+02	1.67E+02
	73	CHUC-10	10/1/01	10/3/01	5.53E+03	DET	DET
	79	CHUC-11	10/1/01	10/12/01	1.85E+03	1.68E+02	1.25E+02
	85	CHUC-12	10/1/01	10/17/01	**1.88E+03**	9.88E+01	1.05E+02
	92	CHUC-13	10/15/01	10/19/01	1.25E+03	4.58E+01	DET
	93	CHUC-13C	10/15/01	10/19/01	1.34E+03	6.52E+01	DET
	106	CHUC-14	10/15/01	10/19/01	7.97E+02	1.01E+02	1.04E+02
	112	CHUC-15	10/15/01	10/18/01	9.42E+02	2.02E+02	1.59E+02
	118	CHUC-16	10/9/01	10/24/01	**2.82E+03**	1.59E+02	1.74E+02
	125	CHUC-17	10/22/01	10/24/01	**3.76E+03**	5.02E+01	DET
	126	CHUC-17C	10/22/01	10/25/01	**3.71E+03**	4.43E+01	DET
	136	CHUC-18	10/23/01	10/26/01	**4.58E+03**	7.10E+01	8.81E+01
	142	CHUC-19	10/22/01	10/29/01	**7.12E+03**	2.30E+02	1.44E+02
	148	CHUC-20	10/22/01	10/29/01	**2.58E+03**	1.25E+02	9.48E+01
	156	CHUC-21	10/25/01	10/30/01	**3.12E+03**	2.12E+02	2.55E+02
	164	CHUC-22	10/26/01	10/27/01	1.65E+03	1.35E+02	1.23E+02
	171	CHUC-23	10/26/01	10/29/01	9.74E+02	6.21E+01	7.76E+01
	172	CHUC-23C	10/26/01	10/30/01	9.73E+02	5.27E+01	DET
	182	CHUC-24	10/25/01	11/7/01	**3.92E+03**	1.11E+02	1.10E+02
	188	CHUC-25	11/5/01	11/7/01	**2.23E+03**	2.27E+02	2.16E+02
	194	CHUC-26	11/5/01	11/9/01	**2.78E+03**	8.54E+01	8.94E+01
	202	CHUC-27	11/5/01	11/9/01	**2.24E+03**	**5.61E+02**	**6.66E+02**
	203	CHUC-27C	11/5/01	11/9/01	**2.24E+03**	**5.56E+02**	**6.19E+02**
	213	CHUC-28	11/5/01	11/13/01	**1.08E+03**	8.89E+02	9.37E+02
	219	CHUC-29	11/9/01	11/9/01	1.12E+03	8.54E+01	1.29E+02
	228	CHUC-30	11/9/01	11/13/01	4.09E+02	DET	DET
	235	CHUC-31	11/9/01	11/14/01	3.55E+02	DET	DET
	236	CHUC-31C	11/9/01	11/14/01	4.29E+02	DET	DET
	245	CHUC-32	11/9/01	11/19/01	1.04E+03	DET	DET

Table 4: Monterey/Santa Cruz County Ambient Monitoring Results

Site	Log Number	Sample Identification	Date Received	Date Analyzed	Results (ng/m^3)		
					Bromomethane	Cis-1,3-dichloropropene	Trans-1,3-dichloropropene
LJE	5	LJEC-01	9/11/01	9/14/01	1.99E+03	DET	DET
	6	LJEC-01C	9/11/01	9/14/01	2.29E+03	<MDL	<MDL
	15	LJEC-02	9/11/01	9/19/01	**2.41E+04**	<MDL	<MDL
	22	LJEC-03-	9/13/01	9/20/01	**1.87E+04**	<MDL	<MDL
	28	LJEC-04	9/13/01	9/20/01	**2.09E+04**	<MDL	<MDL
	37	LJEC-05	9/20/01	9/24/01	1.20E+03	<MDL	<MDL
	38	LJEC-05C	9/20/01	9/24/01	1.20E+03	<MDL	<MDL
	49	LJEC-06	9/20/01	9/26/01	**9.41E+02**	<MDL	<MDL
	55	LJEC-07	9/26/01	10/1/01	4.63E+03	DET	DET
	61	LJEC-08	9/27/01	10/1/01	2.03E+03	DET	DET
	68	LJEC-09	10/1/01	10/4/01	2.96E+03	DET	DET
	74	LJEC-10	10/1/01	10/3/01	2.69E+03	5.26E+01	6.77E+01
	80	LJEC-11	10/1/01	10/12/01	1.02E+03	DET	DET
	86	LJEC-12	10/1/01	10/12/01	8.70E+02	3.99E+02	3.37E+02
	94	LJEC-13	10/15/01	10/19/01	1.67E+03	8.07E+01	8.61E+01
	95	LJEC-13C	10/15/01	10/19/01	1.60E+03	6.42E+01	DET
	107	LJEC-14	10/15/01	10/19/01	6.55E+02	DET	DET
	113	LJEC-15	10/15/01	10/18/01	1.25E+03	DET	DET
	119	LJEC-16	10/15/01	10/25/01	**1.52E+03**	8.21E+01	1.06E+02
	127	LJEC-17	10/22/01	10/26/01	**5.69E+03**	7.03E+01	9.48E+01
	128	LJEC-17C	10/22/01	10/26/01	**5.36E+03**	5.06E+01	6.52E+01
	137	LJEC-18	10/22/01	10/26/01	**1.12E+04**	1.38E+02	1.62E+02
	143	LJEC-19	10/22/01	10/29/01	**2.87E+04**	1.28E+02	1.55E+02
	149	LJEC-20	10/23/01	10/30/01	**2.50E+04**	5.13E+01	DET
	157	LJEC-21	10/25/01	10/30/01	**1.00E+04**	6.05E+01	8.95E+01
	165	LJEC-22	10/26/01	10/31/01	**1.68E+03**	7.28E+01	1.23E+02
	173	LJEC-23	10/26/01	10/30/01	5.19E+02	DET	DET
	174	LJEC-23C	10/26/01	10/30/01	5.49E+02	DET	DET
	183	LJEC-24	10/26/01	11/7/01	**3.58E+04**	2.63E+03	2.26E+03
	189	LJEC-25	11/5/01	11/8/01	**1.55E+04**	3.15E+02	3.18E+02
	195	LJEC-26	11/5/01	11/9/01	**5.18E+04**	2.59E+02	2.10E+02
	204	LJEC-27	11/5/01	11/13/01	**5.77E+04**	3.48E+02	3.31E+02
	205	LJEC-27C	11/5/01	11/9/01	**5.48E+04**	3.38E+02	3.11E+02
	214	LJEC-28	11/5/01	11/13/01	**1.60E+04**	2.10E+02	2.25E+02
	220	LJEC-29	11/9/01	11/13/01	**3.08E+03**	5.88E+01	7.53E+01
	229	LJEC-30	11/9/01	11/13/01	1.36E+03	8.40E+01	9.69E+01
	237	LJEC-31	11/9/01	11/14/01	1.46E+03	4.73E+01	DET
	238	LJEC-31C	11/9/01	11/14/01	1.50E+03	4.89E+01	DET
	246	LJEC-32	11/9/01	11/19/01	1.34E+03	8.46E+01	8.09E+01

Table 4: Monterey/Santa Cruz County Ambient Monitoring Results

Site	Log Number	Sample Identification	Date Received	Date Analyzed	Results (ng/m^3)		
					Bromomethane	Cis-1,3-dichloropropene	Trans-1,3-dichloropropene
MES	9	MESC-01	9/11/01	9/13/01	2.43E+02	<MDL	<MDL
	10	MESC-01C	9/11/01	9/13/01	2.69E+02	<MDL	<MDL
	17	MESC-02	9/11/01	9/19/01	**1.47E+04**	3.57E+02	3.79E+02
	24	MESC-03	9/13/01	9/20/01	**4.06E+04**	1.21E+02	1.50E+02
	30	MESC-04	9/13/01	9/20/01	**2.62E+04**	4.44E+02	4.37E+02
	41	MESC-05	9/20/01	9/25/01	**4.23E+03**	9.40E+01	9.72E+01
	42	MESC-05C	9/20/01	9/25/01	**4.02E+03**	9.67E+01	1.03E+02
	51	MESC-06	9/20/01	9/26/01	**2.96E+03**	9.98E+01	1.03E+02
	57	MESC-07	9/26/01	10/1/01	3.91E+03	2.06E+02	2.02E+02
	63	MESC-08	9/26/01	10/1/01	2.70E+03	1.12E+02	1.21E+02
	70	MESC-09	10/1/01	10/3/01	2.55E+04	3.21E+03	2.68E+03
	76	MESC-10	10/1/01	10/3/01	7.39E+04	1.05E+04	8.44E+03
	82	MESC-11	10/1/01	10/18/01	**4.18E+04**	**1.88E+03**	**1.25E+03**
	88	MESC-12	10/1/01	10/18/01	**7.26E+04**	3.86E+03	3.42E+03
	98	MESC-13	10/9/01	10/16/01	1.45E+03	DET	DET
	99	MESC-13C	10/9/01	10/16/01	1.38E+03	DET	DET
	109	MESC-14	10/15/01	10/23/01	**7.36E+03**	1.38E+02	1.56E+02
	115	MESC-15	10/15/01	10/23/01	**8.31E+03**	1.88E+02	2.03E+02
	121	MESC-16	10/15/01	10/25/01	**1.42E+05**	**8.43E+02**	**9.26E+02**
	131	MESC-17	10/23/01	10/25/01	**8.16E+04**	1.78E+02	2.00E+02
	132	MESC-17C	10/22/01	10/25/01	**9.16E+04**	1.89E+02	2.17E+02
	139	MESC-18	10/23/01	10/26/01	**7.00E+04**	5.96E+02	6.15E+02
	145	MESC-19	10/22/01	10/29/01	**2.43E+04**	5.50E+02	6.71E+02
	151	MESC-20	10/22/01	10/30/01	**1.76E+04**	7.27E+02	1.00E+03
	159	MESC-21	10/26/01	10/31/01	**9.93E+03**	4.51E+02	4.51E+02
	167	MESC-22	10/26/01	10/29/01	1.34E+03	6.49E+01	8.89E+01
	177	MESC-23	10/25/01	11/5/01	**6.67E+03**	2.06E+02	2.30E+02
	178	MESC-23C	10/25/01	11/6/01	**6.60E+03**	1.91E+02	1.97E+02
	185	MESC-24	10/26/01	10/31/01	**2.97E+04**	3.81E+02	4.21E+02
	191	MESC-25	11/5/01	11/8/01	**1.70E+04**	1.35E+02	1.64E+02
	197	MESC-26	11/5/01	11/9/01	**1.21E+04**	9.35E+01	1.22E+02
	208	MESC-27	11/5/01	11/13/01	**1.54E+04**	1.45E+02	1.63E+02
	209	MESC-27C	11/5/01	11/13/01	**1.46E+04**	9.44E+01	1.08E+02
	216	MESC-28		NOT ANALYZED			
	222	MESC-29	11/9/01	11/10/01	7.57E+02	DET	DET
	231	MESC-30	11/9/01	11/14/01	**3.68E+03**	DET	DET
	241	MESC-31	11/9/01	11/20/01	9.61E+03	8.73E+01	9.06E+01
	248	MESC-32	11/9/01	11/28/01	**1.20E+03**	1.07E+02	9.29E+01
	249	MESC-32C	11/9/01	11/20/01	8.22E+02	7.08E+01	DET

Table 4: Monterey /Santa Cruz County Ambient Monitoring Results

Site	Log Number	Sample Identification	Date Received	Date Analyzed	Results (ng/m^3)		
					Bromomethane	Cis-1,3-dichloropropene	Trans-1,3-dichloropropene
PMS	7	PMSC-01	9/11/01	9/13/01	1.31E+03	<MDL	<MDL
	8	PMSC-01C	9/11/01	9/14/01	1.72E+03	<MDL	<MDL
	16	PMSC-02	9/11/01	9/19/01	**1.63E+04**	DET	DET
	23	PMSC-03	9/13/01	9/20/01	**2.30E+04**	9.11E+01	1.14E+02
	29	PMSC-04	9/13/01	9/20/01	**1.46E+04**	6.49E+01	7.90E+01
	39	PMSC-05	9/20/01	9/25/01	**3.77E+03**	6.98E+01	6.79E+01
	40	PMSC-05C	9/20/01	9/25/01	**4.52E+03**	1.01E+02	1.08E+02
	50	PMSC-06	9/20/01	9/26/01	**2.89E+03**	1.16E+02	1.27E+02
	56	PMSC-07	9/26/01	10/1/01	6.65E+03	8.32E+01	9.28E+01
	62	PMSC-08	9/26/01	10/1/01	4.41E+03	1.22E+02	1.40E+02
	69	PMSC-09	10/1/01	10/4/01	9.95E+03	1.86E+02	1.50E+02
	75	PMSC-10	10/1/01	10/12/01	**5.10E+04**	2.28E+03	1.92E+03
	81	PMSC-11	10/1/01	10/17/01	**1.26E+04**	3.85E+02	4.04E+02
	87	PMSC-12	10/1/01	10/18/01	**5.09E+04**	7.89E+02	7.46E+02
	96	PMSC-13	10/15/01	10/23/01	**1.92E+03**	DET	DET
	97	PMSC-13C	10/9/01	10/16/01	**2.39E+03**	DET	DET
	108	PMSC-14	10/15/01	10/22/01	**3.10E+03**	1.07E+02	6.86E+01
	114	PMSC-15	10/15/01	10/22/01	**6.26E+03**	1.04E+02	1.15E+02
	120	PMSC-16	10/9/01	10/23/01	**1.14E+04**	1.21E+02	1.30E+02
	129	PMSC-17	10/22/01	10/23/01	**1.10E+04**	2.14E+02	2.32E+02
	130	PMSC-17C	10/23/01	10/24/01	**1.10E+04**	2.33E+02	2.72E+02
	138	PMSC-18	10/22/01	10/26/01	**8.18E+04**	2.94E+02	3.15E+02
	144	PMSC-19	10/22/01	10/29/01	**3.88E+04**	3.02E+02	3.22E+02
	150	PMSC-20	10/23/01	10/30/01	**3.08E+04**	2.23E+02	2.60E+02
	158	PMSC-21	10/26/01	10/31/01	**7.80E+03**	9.64E+01	1.19E+02
	166	PMSC-22	10/26/01	10/29/01	1.46E+03	8.24E+01	1.06E+02
	175	PMSC-23	10/25/01	11/5/01	**1.51E+03**	9.64E+01	1.19E+02
	176	PMSC-23C	10/25/01	11/5/01	**1.42E+03**	1.06E+02	1.08E+02
	184	PMSC-24	10/26/01	11/7/01	**7.99E+03**	2.30E+02	2.52E+02
	190	PMSC-25	11/5/01	11/8/01	**9.46E+03**	DET	DET
	196	PMSC-26	11/5/01	11/9/01	**2.06E+03**	DET	DET
	206	PMSC-27	11/5/01	11/10/01	**6.04E+03**	**8.84E+02**	**7.34E+02**
	207	PMSC-27C	11/5/01	11/10/01	**6.03E+03**	**9.35E+02**	**8.07E+02**
	215	PMSC-28	11/5/01	11/13/01	**1.33E+03**	6.72E+01	7.96E+01
	221	PMSC-29	11/9/01	11/9/01	5.86E+02	5.20E+01	DET
	230	PMSC-30	11/9/01	11/13/01	1.37E+03	8.19E+01	8.83E+01
	239	PMSC-31	11/9/01	11/20/01	4.86E+03	1.17E+02	8.77E+01
	240	PMSC-31C	11/9/01	11/20/01	4.39E+03	1.18E+02	9.65E+01
	247	PMSC-32	11/9/01	11/28/01	**1.59E+03**	1.37E+02	1.29E+02

Table 4: Monterey/Santa Cruz County Ambient Monitoring Results

Site	Log Number	Sample Identification	Date Received	Date Analyzed	Results (ng/m^3)		
					Bromomethane	Cis-1,3-dichloropropene	Trans-1,3-dichloropropene
SAL	1	SALC-01	9/11/01	9/14/01	1.82E+03	<MDL	<MDL
	2	SALC-01C	9/11/01	9/14/01	1.87E+03	<MDL	<MDL
	13	SALC-02	9/11/01	9/19/01	**3.83E+03**	<MDL	<MDL
	20	SALC-03	9/13/01	9/19/01	**1.67E+04**	<MDL	<MDL
	26	SALC-04	9/13/01	9/20/01	**1.27E+04**	<MDL	<MDL
	33	SALC-05	9/20/01	9/21/01	6.45E+02	<MDL	<MDL
	34	SALC-05C	9/20/01	9/24/01	6.03E+02	5.36E+01	7.63E+01
	45	SALC-06	9/20/01	9/25/01	8.11E+02	<MDL	<MDL
	53	SALC-07	9/26/01	10/1/01	2.13E+03	DET	DET
	59	SALC-08	9/26/01	9/26/01	1.26E+03	<MDL	<MDL
	66	SALC-09	9/26/01	10/1/01	1.79E+03	3.51E+02	2.52E+02
	72	SALC-10	10/1/01	10/4/01	4.70E+03	1.93E+02	1.86E+02
	78	SALC-11	10/1/01	10/12/01	1.07E+03	5.48E+01	8.42E+01
	84	SALC-12	10/1/01	10/15/01	1.19E+03	5.01E+02	4.25E+02
	90	SALC-13	10/9/01	10/15/01	1.28E+03	DET	DET
	91	SALC-13C	10/9/01	10/15/01	1.27E+03	DET	DET
	102	SALC-14	10/15/01	10/19/01	4.69E+02	<MDL	<MDL
	111	SALC-15	10/15/01	10/22/01	1.18E+03	<MDL	<MDL
	117	SALC-16	10/15/01	10/24/01	**9.40E+03**	6.32E+02	8.27E+02
	123	SALC-17	10/22/01	10/24/01	**9.49E+03**	1.08E+02	1.39E+02
	124	SALC-17C	10/22/01	10/25/01	**8.81E+03**	1.09E+02	1.46E+02
	135	SALC-18	10/23/01	10/25/01	**3.46E+04**	2.11E+02	2.89E+02
	141	SALC-19	10/22/01	10/26/01	**3.59E+04**	2.71E+02	3.15E+02
	147	SALC-20	10/22/01	10/29/01	**1.61E+04**	6.94E+01	1.57E+02
	154	SALC-21	10/25/01	10/29/01	4.80E+03	1.61E+02	3.36E+02
	163	SALC-22	10/26/01	11/5/01	**1.39E+03**	DET	DET
	169	SALC-23	10/26/01	10/29/01	5.56E+02	DET	DET
	170	SALC-23C	10/26/01	10/29/01	5.48E+02	DET	DET
	181	SALC-24	10/25/01	11/7/01	**3.16E+03**	DET	DET
	187	SALC-25	11/5/01	11/7/01	**3.91E+03**	2.39E+02	2.36E+02
	193	SALC-26	11/5/01	11/8/01	**2.25E+03**	2.46E+02	1.70E+02
	200	SALC-27	11/5/01	11/8/01	**2.12E+03**	2.85E+02	2.54E+02
	201	SALC-27C	11/5/01	11/9/01	**2.32E+03**	2.14E+02	1.93E+02
	212	SALC-28	11/5/01	11/13/01	**1.88E+03**	1.80E+02	1.78E+02
	218	SALC-29	11/9/01	11/9/01	1.18E+03	4.77E+01	DET
	224	SALC-30	11/9/01	11/10/01	6.07E+02	DET	DET
	233	SALC-31	11/9/01	11/14/01	3.76E+02	DET	DET
	234	SALC-31C	11/9/01	11/14/01	3.64E+02	DET	DET
	244	SALC-32	11/9/01	11/19/01	6.72E+02	5.43E+01	DET

Table 4: Monterey/Santa Cruz County Ambient Monitoring Results

Site	Log Number	Sample Identification	Date Received	Date Analyzed	Results (ng/m^3)		
					Bromomethane	Cis-1,3-dichloropropene	Trans-1,3-dichloropropene
SES	11	SESC-01	9/11/01	9/13/01	5.07E+02	<MDL	<MDL
	12	SESC-01C	9/11/01	9/13/01	4.82E+02	<MDL	<MDL
	18	SESC-02	9/11/01	9/19/01	**6.00E+03**	4.64E+01	DET
	25	SESC-03	9/13/01	9/20/01	**7.75E+02**	DET	DET
	32	SESC-04	9/13/01	9/20/01	**7.15E+02**	DET	DET
	43	SESC-05	9/20/01	9/26/01	**4.33E+03**	8.59E+01	9.09E+01
	44	SESC-05C	9/20/01	9/26/01	**4.44E+03**	8.31E+01	9.34E+01
	52	SESC-06	9/20/01	9/26/01	**3.89E+03**	1.54E+02	1.64E+02
	58	SESC-07	9/26/01	10/1/01	1.10E+04	4.50E+02	6.01E+02
	64	SESC-08	9/26/01	10/2/01	4.02E+03	1.40E+02	1.75E+02
	71	SESC-09	10/1/01	10/3/01	6.01E+03	<MDL	<MDL
	77	SESC-10	10/1/01	10/12/01	1.94E+03	1.70E+02	1.82E+02
	83	SESC-11	10/1/01	10/15/01	9.00E+03	2.47E+02	2.71E+02
	89	SESC-12	10/1/01	10/15/01	4.39E+03	9.76E+01	9.54E+01
	100	SESC-13	10/15/01	10/23/01	1.73E+03	DET	DET
	101	SESC-13C	10/15/01	10/23/01	1.57E+03	DET	DET
	110	SESC-14	10/15/01	10/24/01	3.00E+03	DET	DET
	116	SESC-15	10/15/01	10/18/01	4.21E+03	7.08E+01	6.92E+01
	122	SESC-16	10/9/01	10/23/01	1.24E+03	DET	DET
	133	SESC-17	10/22/01	10/25/01	**5.34E+03**	4.55E+01	DET
	134	SESC-17C	10/22/01	10/25/01	**5.26E+03**	DET	DET
	140	SESC-18	10/23/01	10/26/01	**1.64E+04**	8.88E+01	8.73E+01
	146	SESC-19	10/22/01	10/29/01	**1.56E+04**	6.40E+01	7.82E+01
	152	SESC-20	10/22/01	10/30/01	**2.26E+03**	DET	DET
	160	SESC-21	10/26/01	10/31/01	**7.89E+03**	2.41E+02	2.39E+02
	168	SESC-22	10/26/01	11/5/01	**9.48E+02**	4.74E+01	6.64E+01
	179	SESC-23	10/25/01	11/7/01	**2.34E+03**	5.76E+01	DET
	180	SESC-23C	10/25/01	11/7/01	**2.09E+03**	5.02E+01	DET
	186	SESC-24	10/26/01	11/7/01	**2.06E+04**	8.80E+01	8.55E+01
	192	SESC-25	11/5/01	11/8/01	**1.31E+03**	DET	DET
	198	SESC-26	11/5/01	11/8/01	**1.43E+03**	DET	DET
	210	SESC-27	11/5/01	11/13/01	**1.86E+03**	DET	DET
	211	SESC-27C	11/5/01	11/13/01	**1.88E+03**	DET	DET
	217	SESC-28	11/9/01	11/14/01	2.74E+02	DET	DET
	223	SESC-29	11/9/01	11/10/01	4.42E+02	6.38E+01	6.41E+01
	232	SESC-30	11/9/01	11/14/01	7.36E+02	DET	DET
	242	SESC-31	11/9/01	11/20/01	4.00E+03	1.94E+02	1.44E+02
	243	SESC-31C	11/9/01	11/28/01	**2.99E+03**	2.16E+02	1.51E+02
	250	SESC-32	11/9/01	11/28/01	**7.20E+03**	1.92E+02	1.88E+02

Table 4 Notes: Monterey/Santa Cruz County Ambient Monitoring

Bold highlight indicates results obtained from instrument MSD-3.

If analytical result is ≥ MDL and < EQL it is reported in the table as detected (DET). Levels ≥ EQL are reported as the actual measured value and are reported to three significant figures.

<MDL = Less than method detection limit

Sample identification numbers followed by the letter C are colocated samples for the samples with the corresponding number.

Footnotes:

MESC-28 (Log# 216): sample controller did not run, sample was not collected.

Site location identification:

SAL: APCD monitoring site in Salinas
MES: Mac Quiddy Elementary School
CHU: Chualar School
LJE: La Joya Elementary School
PMS: Pajaro Middle School
SES: Salsipuedes Elementary School

NA Not Applicable: Data not collected for this sample due to laboratory error.

TABLE 5: Laboratory Duplicate Precision for Bromomethane and 1,3-Dichloropropene (Telone)

MSD-4

Site	Log #	Sample IID	Date Received	Date Analyzed	Results (ng/m^3)			Relative Percent Difference		
					Bromomethane	Cis-Telone	Trans-Telone	Bromomethane	Cis-Telone	Trans-Telone
CHU	21	CHUC-03	13-Sep-01	17-Sep-01	3.26E+03	<MDL	<MDL			
					3.30E+03	<MDL	<MDL	-1.26	<MDL	<MDL
	142	CHUC-19	22-Oct-01	25-Oct-01	5.37E+03	2.30E+02	1.44E+02			
					5.45E+03	2.36E+02	1.50E+02	-1.45	-2.82	-3.75
	164	CHUC-22	26-Oct-01	27-Oct-01	1.65E+03	1.35E+02	1.23E+02			
					1.64E+03	1.32E+02	1.04E+02	0.73	2.40	16.73
LJE	107	LJEC-14	15-Oct-01	19-Oct-01	6.55E+02	DET	DET			
					6.68E+02	DET	DET	-1.92	NA	NA
	175	LJEC-23C	26-Oct-01	30-Oct-01	5.49E+02	DET	DET			
					5.58E+02	DET	DET	-1.63	NA	NA
MES	121	MESC-16	15-Oct-01	23-Oct-01	1.89E+04	8.52E+02	9.20E+02			
					1.90E+04	8.43E+02	9.26E+02	-0.42	1.09	-0.65
	132	MESC-17C	22-Oct-01	24-Oct-01	1.57E+04	1.89E+02	2.17E+02			
					1.58E+04	1.88E+02	2.18E+02	-0.46	0.75	-0.53
	197	MESC-26	05-Nov-01	06-Nov-01	7.09E+03	9.35E+01	1.22E+02			
					7.10E+03	8.92E+01	1.17E+02	-0.19	4.67	4.49
PMS	39	PMSC-05	20-Sep-02	24-Sep-01	3.55E+03	6.98E+01	6.79E+01			
					3.35E+03	6.23E+01	6.32E+01	5.66	11.48	7.19
	96	PMSC-13	15-Oct-01	18-Oct-01	2.38E+03	DET	DET			
					2.48E+03	DET	DET	-3.91	NA	NA

TABLE 5: Laboratory Duplicate Precision for Bromomethane and 1,3-Dichloropropene (Telone)

MSD-4

Site	Log #	Sample IID	Date Received	Date Analyzed	Results (ng/m^3)			Relative Percent Difference		
					Bromomethane	Cis-Telone	Trans-Telone	Bromomethane	Cis-Telone	Trans-Telone
SAL	13	SALC-02	11-Sep-01	13-Sep-01	4.90E+03	<MDL	<MDL			
					4.91E+03	<MDL	<MDL	-0.27	<MDL	<MDL
	66	SALC-09	27-Sep-01	02-Oct-01	1.79E+03	3.51E+02	2.52E+02			
					1.85E+03	4.01E+02	2.80E+02	-3.72	-13.13	-10.50
	212	SALC-28	05-Nov-01	08-Nov-01	2.03E+03	1.80E+02	1.78E+02			
					2.06E+03	1.92E+02	1.87E+02	-1.53	-6.48	-5.22
	224	SALC-30	09-Nov-01	10-Nov-01	6.07E+02	DET	DET			
					5.98E+02	DET	DET	1.39	NA	NA
SES	32	SESC-04	13-Sep-01	18-Sep-01	1.57E+03	DET	DET			
					1.55E+03	DET	DET	1.34	NA	NA
	52	SESC-06	20-Sep-01	25-Sep-01	3.79E+03	1.54E+02	1.64E+02			
					3.88E+03	1.61E+02	1.69E+02	-2.28	-4.60	-3.06
	64	SESC-08	26-Sep-01	27-Sep-01	3.85E+03	1.53E+02	1.60E+02			
					4.24E+03	1.38E+02	1.47E+02	-9.56	10.15	8.19
	89	SESC-12	01-Oct-01	13-Oct-01	4.82E+03	1.70E+02	1.76E+02			
					4.50E+03	1.35E+02	1.33E+02	6.86	23.01	27.74
	152	SESC-20	22-Oct-01	26-Oct-01	2.35E+03	DET	DET			
					2.37E+03	DET	DET	-0.55	NA	NA
	186	SESC-24	26-Oct-01	31-Oct-01	1.07E+04	8.80E+01	8.55E+01			
					1.05E+04	8.18E+01	8.46E+01	2.54	7.31	1.05
	250	SESC-32	09-Nov-01	20-Nov-01	4.76E+03	1.92E+02	1.88E+02			
					4.97E+03	2.02E+02	1.90E+02	-4.26	-5.04	-1.44

TABLE 5: Laboratory Duplicate Precision for Bromomethane and 1,3-Dichloropropene (Telone)

MSD-3

Site	Log #	Sample IID	Date Received	Date Analyzed	Results (ng/m^3)			Relative Percent Difference		
					Bromomethane	Cis-Telone	Trans-Telone	Bromomethane	Cis-Telone	Trans-Telone
CHU	85	CHUC-12	01-Oct-01	17-Oct-01	1.88E+03	<MDL	<MDL			
					1.87E+03	<MDL	<MDL	0.53	NA	NA
LJE	15	LJEC-002	11-Sep-01	19-Sep-01	2.41E+04	<MDL	<MDL			
					2.40E+04	<MDL	<MDL	0.37	NA	NA
	127	LJEC-17	22-Oct-01	24-Oct-01	5.69E+03	<MDL	<MDL			
					5.76E+03	<MDL	<MDL	-1.22	NA	NA
	149	LJEC-20	23-Oct-01	30-Oct-01	1.96E+04	<MDL	<MDL			
					1.95E+04	<MDL	<MDL	0.26	NA	NA
	204	LJEC-27	05-Nov-01	09-Nov-01	5.66E+04	<MDL	<MDL			
					5.62E+04	<MDL	<MDL	0.82	NA	NA
	214	LJEC-28	05-Nov-01	13-Nov-01	1.60E+04	<MDL	<MDL			
					1.60E+04	<MDL	<MDL	-0.06	NA	NA
MES	24	MESC-003	13-Sep-01	20-Sep-01	4.06E+04	<MDL	<MDL			
					4.03E+04	<MDL	<MDL	0.67	NA	NA
	115	MESC-15	15-Oct-01	23-Oct-01	8.31E+03	<MDL	<MDL			
					8.36E+03	<MDL	<MDL	-0.60	NA	NA
	132	MESC-17C	22-Oct-01	25-Oct-01	9.16E+04	<MDL	<MDL			
					9.20E+04	<MDL	<MDL	-0.45	NA	NA
	185	MESC-24	26-Oct-01	31-Oct-01	2.83E+04	<MDL	<MDL			
					2.83E+04	<MDL	<MDL	0.00	NA	NA

TABLE 5: Laboratory Duplicate Precision for Bromomethane and 1,3-Dichloropropene (Telone)

MSD-3

Site	Log #	Sample IID	Date Received	Date Analyzed	Results (ng/m^3)			Relative Percent Difference		
					Bromomethane	Cis-Telone	Trans-Telone	Bromomethane	Cis-Telone	Trans-Telone
PMS	29	PMSC-004	13-Sep-01	20-Sep-01	1.46E+04	<MDL	<MDL			
					1.48E+04	<MDL	<MDL	-1.23	NA	NA
SAL	141	SALC-19	22-Oct-01	26-Oct-01	3.59E+04	<MDL	<MDL			
					3.50E+04	<MDL	<MDL	2.60	NA	NA
SES	52	SESC-006	20-Sep-01	26-Sep-01	3.89E+03	<MDL	<MDL			
					3.91E+03	<MDL	<MDL	-0.51	NA	NA
	160	SESC-21	26-Oct-01	31-Oct-01	7.89E+03	<MDL	<MDL			
					8.15E+03	<MDL	<MDL	-3.24	NA	NA
	217	SESC-28	09-Nov-01	14-Nov-01	<MDL	<MDL	<MDL			
					<MDL	<MDL	<MDL	<MDL	NA	NA

Notes:

DET	Detected below the estimated quantitation limit
ID	Identification number
<MDL	Less then the minimum detection limit
m^3	Cubic meters
ml	Milliliters
NA	Not applicable
Ng	Nanograms

TABLE 6: Laboratory Control Sample Results

MSD-4

Date Analyzed	Results (ng/m^3)		
	Bromomethane	cis-1,3-dichloropropene	trans-1,3-dichloropropene
12-Sep-01	131.3	156.2	141.8
14-Sep-01	138.8	157.8	146.9
18-Sep-01	142.9	164.5	151.9
20-Sep-01	135.3	157.6	145.2
21-Sep-01	132.0	145.8	140.7
24-Sep-01	128.8	138.5	132.9
24-Sep-01	139.8	148.1	140.9
25-Sep-01	135.3	150.9	142.5
26-Sep-01	138.9	155.4	149.0
01-Oct-01	133.4	154.5	129.2
12-Oct-01	126.3	150.8	143.8
15-Oct-01	126.1	145.9	139.0
17-Oct-01	130.0	136.7	133.7
18-Oct-01	130.5	144.7	134.5
22-Oct-01	124.2	165.7	159.8
23-Oct-01	128.1	156.2	151.4
24-Oct-01	129.1	160.0	153.7
25-Oct-01	133.2	153.2	143.3
26-Oct-01	128.6	146.1	133.6
29-Oct-01	133.3	163.6	151.3
30-Oct-01	137.7	148.1	139.2
05-Nov-01	122.7	156.2	145.1
07-Nov-01	129.3	159.9	146.2
09-Nov-01	123.1	151.6	132.8
13-Nov-01	127.8	154.7	125.3
15-Nov-01	131.9	148.1	121.7
19-Nov-01	143.8	169.7	135.8
20-Nov-01	132.9	165.5	133.8

TABLE 6: Laboratory Control Sample Results

MSD-3

Date Analyzed	Results ($\mu g/m^3$)		
	Bromomethane	cis-1,3-dichloropropene	trans-1,3-dichloropropene
18-Sep-01	4.64	4.69	3.92
19-Sep-01	4.17	4.58	3.89
20-Sep-01	3.91	NA	NA
25-Sep-01	3.30	3.60	3.14
26-Sep-01	4.44	3.93	3.38
12-Oct-01	3.98	4.63	4.02
16-Oct-01	4.03	4.47	3.94
18-Oct-01	4.06	4.60	4.24
23-Oct-01	3.01	3.86	3.80
24-Oct-01	5.75	4.42	3.56
25-Oct-01	5.23	5.72	4.74
26-Oct-01	5.64	4.17	3.59
29-Oct-01	5.00	4.71	4.03
30-Oct-01	5.02	5.10	4.39
5-Nov-01	4.86	4.90	4.06
7-Nov-01	4.27	4.19	3.44
8-Nov-01	4.55	5.55	4.51
9-Nov-01	5.23	5.36	4.94
13-Nov-01	5.01	5.98	4.98
14-Nov-01	5.00	4.48	4.05

Table 7: Continuing Calibration Verification Standard Results Summary For Instruments MSD-3 and MSD-4

MSD-3

Analyte	Average Expected *Concentration* ($\mu g/m^3$)	Average Actual Concentration ($\mu g/m^3$)	Average Percent Recovery	Average Percent Standard Deviation
Bromomethane	1.412	1.397	98.9	9.90
Cis-1,3-dichloropropene	0.659	0.657	100.0	14.28
Trans-1,3-dichlorpropene	0.591	0.588	98.9	14.25

MSD-4

Analyte	Average Expected Concentration (ng/m^3)	Average Actual Concentration (ng/m^3)	Average Percent Recovery	Average Percent Standard Deviation
Bromomethane	106	110	104	6.07
Cis-1,3-dichloropropene	47.8	50	105	3.81
Trans-1,3-dichlorpropene	42.9	45	105	3.42

TABLE 8: Canister Spikes

MSD-4

Trip Spike Results

Received Date	Canister Number	Bromomethane			Cis-1,3-dichloropropene			Trans-1,3-dichloropropene		
		Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)	Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)	Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)
9/20/01	DPR 1055	10.30	12.93	125	11.57	9.81	85	12.00	9.92	83
10/9/01	DPR 1145	10.50	13.44	128	11.70	12.43	106	12.30	12.53	102
10/26/01	DPR 1126	10.50	12.50	119	11.70	10.90	93	12.30	10.70	87
11/9/01	DPR 1139	10.70	13.70	128	11.90	11.80	99	12.50	11.70	94

Field Spike Results**

Received Date	Canister Number	Bromomethane			Cis-1,3-dichloropropene			Trans-1,3-dichloropropene		
		Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)	Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)	Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)
9/20/01	DPR 1051	10.36	12.70	123	11.57	9.48	82	12.10	9.15	76
10/9/01	DPR 1163	10.50	13.17	125	11.70	11.70	100	12.30	11.55	94
10/26/01	DPR 1107	10.40	12.54	121	11.60	10.52	91	12.20	9.96	82
11/9/01	DPR 1050	10.70	13.24	124	11.90	11.58	97	12.50	11.02	88

Lab Spike Results

Analysis Date	Canister Number	Bromomethane			Cis-1,3-dichloropropene			Trans-1,3-dichloropropene		
		Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)	Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)	Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)
9/24/01	DPR 1069	10.50	12.63	120	11.70	9.89	85	12.30	10.10	82
10/25/01	DPR 1059	10.36	13.01	126	11.57	11.84	102	12.10	12.11	100
10/29/01	DPR 1137	10.40	12.90	124	11.60	11.20	97	12.20	12.70	104
11/9/01	DPR 1060	10.50	13.10	125	11.70	11.50	98	12.30	11.20	91

Notes:

** Field spike results are corrected by co-located unspiked field sample results.

TABLE 8: Canister Spikes

MSD-3

Trip Spike Results

Received Date	Canister Number	Bromomethane			Cis-1,3-dichloropropene			Trans-1,3-dichloropropene		
		Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)	Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)	Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)
9/20/01	DPR 1055	10.30	15.63	152	11.57	10.69	92	12.00	9.77	81
10/9/01	DPR 1145	10.56	14.66	139	11.70	13.62	116	12.30	12.38	101
10/9/01*	DPR 1145	10.56	15.38	146	11.70	12.12	104	12.30	11.22	91
10/26/01	DPR 1126	10.50	15.92	152	11.70	12.68	108	12.30	12.80	104
11/9/01	DPR 1139	10.70	15.96	149	11.90	10.98	92	12.50	11.32	91

Field Spike Results**

Received Date	Canister Number	Bromomethane			Cis-1,3-dichloropropene			Trans-1,3-dichloropropene		
		Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)	Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)	Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)
9/20/01	DPR 1051	10.36	16.27	157	11.57	10.20	88	12.10	9.04	75
9/20/01*	DPR 1051	10.36	15.82	153	11.57	10.65	92	12.10	9.48	78
10/9/01	DPR 1163	10.50	15.24	145	11.70	12.30	105	12.30	11.52	94
10/26/01	DPR 1107	10.40	16.64	160	11.60	12.46	107	12.20	12.20	100
11/9/01	DPR 1050	10.70	16.43	154	11.90	10.64	89	12.50	10.42	83

Lab Spike Results

Analysis Date	Canister Number	Bromomethane			Cis-1,3-dichloropropene			Trans-1,3-dichloropropene		
		Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)	Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)	Expected ($\mu g/m^3$)	Actual ($\mu g/m^3$)	Recovery (%)
9/24/01	DPR 1069	10.50	15.64	149	11.70	11.23	96	12.30	9.95	81
10/25/01	DPR1059	10.36	16.66	161	11.57	14.62	126	12.10	13.40	111
10/25/01*	DPR 1059	10.36	17.32	167	11.57	13.68	118	12.10	12.48	103
10/29/01	DPR 1137	10.40	15.40	148	11.60	11.66	101	12.20	11.04	90
11/9/01	DPR 1060	10.50	15.76	150	11.70	10.46	89	12.30	10.10	82

Notes:

* Duplicate sample analysis

** Field spike results are corrected by co-located unspiked field sample results.

TABLE 9: *Trip Blank Results*

MSD-4

Canister Number	Date	Bromomethane	Cis-1,3-dichloropropene	Trans-1,3-dichloropropene
DPR 1132	9/17/01	<MDL	<MDL	<MDL
DPR 1178	10/1/01	DET	<MDL	<MDL
DPR 1067	10/16/01	<MDL	<MDL	<MDL
DPR 1186	10/26/01	<MDL	<MDL	<MDL
DPR 1097	10/26/01	<MDL	<MDL	<MDL
DPR 1067	11/6/01	<MDL	<MDL	<MDL
DPR 1124	11/15/01	<MDL	<MDL	<MDL

TABLE 10: Santa Cruz County Background Results

Sample Identification	Date Received	Date Analyzed	Results ($\mu g/m^3$)		
			Methyl Bromide	Cis-Telone	Trans-Telone
SCFC-1	10/01/01	10/17/01	1.61E+00	DET	DET
SCFC-2	10/01/01	10/17/01	1.49E+00	DET	DET
SCFC-3	10/01/01	10/17/01	2.88E+00	DET	DET
SCFC-4	10/01/01	10/17/01	9.67E-01	DET	DET

Notes:

$\mu g/m^3$ Microgram per cubic meter
DET Detected

Appendices: 1 through 4

Appendix 1

Standard Operating Procedure Sampling and Analysis of Bromomethane and 1,3-dichloropropene in Silco™ Canisters

California Environmental Protection Agency

Air Resources Board

Northern Laboratory Branch
Monitoring and Laboratory Division
CALIFORNIA AIR RESOURCES BOARD

Standard Operating Procedure for the Sampling and Analysis of Bromomethane and 1,3-dichloropropene In Silco™ Canisters

June 25, 2001

APPROVED BY:

Russell Grace, Manager
Special Analysis Section

DISCLAIMER: Mention of any trade name or commercial product in this Standard Operating Procedure does not constitute endorsement or recommendation of this product by the Air Resources Board. Specific brand names and instrument descriptions listed in the Standard Operating Procedure are equipment used by the ARB laboratory. Any functionally equivalent instrumentation can be used.

1. SCOPE

This method is for the sampling and analysis of bromomethane (Methyl Bromide) and telone (cis-1,3-dichloropropene and trans-1,3-dichloropropene) in ambient air using six-liter Silco™ canisters for sample collection. Collected samples are analyzed by gas chromatography/mass spectrometry using a cryogenic sampler.

2. SUMMARY OF METHOD

Ambient air is collected into evacuated six-liter Silco™ canisters. Field sampling uses a sub-atmospheric pressure collection mode. Sample canisters are pressurized in the laboratory to facilitate laboratory sampling. Samples are analyzed by gas chromatography/mass spectrometry (GC/MS) using a cryogenic concentrator to prepare the air sample. Samples are analyzed in the Selected Ion Monitoring (SIM) mode using deuterated bromomethane (bromomethane-d3) and toluene (toluene-d8) as internal standards.

3. INTERFERENCES/LIMITATIONS

Interference may result from improperly cleaned canisters. Analysis of samples containing high concentrations of bromomethane or telone may cause significant contamination of the analytical equipment. Co-eluting compounds trapped during sample collection may interfere.

4. EQUIPMENT AND CONDITIONS

Instrumentation

Hewlett Packard 6890 Series Plus gas chromatograph:
Column: Restek Rtx-200, 60 meter, 0.32mm I.D., 1.50 micron film thickness
GC temperature program: initial –10° C, initial time 0 minutes, to 80° C @ 10° C/min, to 200° C @ 25° C/min, hold 1 minute, to 240 ° C @ 25° C/min, hold 1 minute.
Carrier Gas: Helium, grade 5

Hewlett Packard 5973 mass selective detector:
Acquisition Mode: SIM
Tune File: PFTBA Autotune
Ions Monitored: 74.8, 93.8, 95.8, 96.8, 98.8, 110.0
Quant Ions: 74.8, 93.8
Solvent Delay: 5.00 min

Varian Stand Alone cryogenic concentrator:
Valve Oven: 60° C
Autosampler Oven: 60° C
Nafion Dryer: 60° C

Sample Line: 60°
Cryotrap: -180° C to 150°
Transfer Line: 150° C
Cryofocus: -180° C to 150° C
Sample Size: 15 ml to 400 ml
Internal Standard Loop: 1 ml

Auxiliary Apparatus

Compressed helium: grade five
Compressed air: ultra zero grade
Compressed nitrogen: grade five
Liquid nitrogen
Gas standards: certified if available
Restek, 6.0 liter Silcosteel canisters: with silcosteel valve
Pressure gauge: able to measure –30mm to 30 psig
Canister cleaning system (see Appendix 2)

5. ANALYSIS OF SAMPLES

A. Perform a PFTBA autotune and evaluate tune criteria (Appendix 3). Place a copy of the autotune results in the autotune folder.
B. Check and record the pressure of the field sample canisters. Pressurize the field sample canisters to approximately 5 psig with ultra pure nitrogen. Record the final pressure.
C. Prepare a sample sequence for the GC/MS. The sequence should include a calibration check, a system blank and a duplicate for every 10 samples. Load the sequence into the GC/MS in the remote start mode.
D. Prepare a sample sequence for the Varian sampler. Organize the sample sequence as follows: system blank, calibration check, field samples, duplicate field sample, calibration check. If the calibration check is not within ±20% of its expected value the system must be evaluated and recalibrated if necessary.
E. Attach the sample canisters to the Varian autosampler ring as per the sequence. Execute the sequence.
F. Sample analysis report will print out after each analysis.

CALCULATIONS: Sub-ambient sampling requires pressurization before analysis. Instrument reports will be in units of ng/m^3 and must be corrected for the analysis dilution using the following calculation:

$(Fp / Ip) \times Ci = Cr$

Fp = final canister pressure in mm Hg
Ip = initial canister pressure in mm Hg
Ci = concentration from the analysis report in ng/m^3
Cr = reported concentration in ng/m^3

6. QUALITY ASSURANCE

A. Instrument Reproducibility

Establish the reproducibility of the instrument and analytical method as follows: Inject five replicate samples of each target compound at three concentrations (low, mid and high range). Reproducibility study results are presented in Table .

B. Linearity

A six-point calibration curve is made for each of the target compounds. The curve is constructed using linear regression analysis. Appendix 4 contains *method calibration data.*

C. Minimum Detection Limit

Detection Limit is based on US EPA MDL calculation. Using the analysis of seven replicates of a low-level spike, the method detection limit (MDL), and the estimated quantitation limit (EQL) for method compounds are calculated by:

$$MDL = 3.14*s$$
$$EQL = 5*MDL$$

where s = the standard deviation of the response calculated for the seven replicate spikes. The MDL and EQL are calculated as follows:

bromomethane MDL = 3.14 (0.0015 ug/m3) = 0.0047 ug/m3
EQL = 5(0.0047 ug/m3) = 0.024 ug/m3

cis-1,3-dichloropropene MDL = 3.14 (0.0019 ug/m3) = 0.0058 ug/m3
EQL = 5(0.0058 ug/m3) = 0.029 ug/m3

trans-1,3-dichloropropene MDL = 3.14 (0.0027 ug/m3) = 0.0085 ug/m3
EQL = 5(0.0085 ug/m3) = 0.043 ug/m3

Assuming a 1:1.5 dilution to pressurize ambient samples:

Bromomethane EQL = 1.5 (0.024 ug/m3) = 0.036 ug/m3

cis-1,3-dichloropropene EQL = 1.5 (0.029 ug/m3) = 0.044 ug/m3

trans-1,3-dichloropropene EQL = 1.5 (0.043 ug/m3) = 0.064 ug/m3

Results are reported to 3 significant figures above the EQL. Results below EQL and above MDL are reported as DET (detected). Results less than MDL are reported as < MDL.

D. Calibration Check

A calibration check sample is analyzed at the beginning of each analytical batch and following each batch of ten samples. The value of the check must be ±20 % of the expected value. If the check is outside limits the prior batch of 10 samples must be reanalyzed.

E. Laboratory Control Sample

A laboratory control sample (LCS) is included with each analytical batch. The analytical value of the LCS must be within three standard deviations of it's historical mean (± 3 σ). If the LCS is outside of limits then the samples in the analytical batch must be reanalyzed.

F. Storage Stability

If the method storage stability of target compounds is unknown then a storage stability study should be conducted. The study should be conducted for a time period which represents the maximum hold time for field samples.

7. SAFETY PRECAUTIONS

This procedure does not address all of the safety concerns associated with chemical analysis. It is the responsibility of the analyst to establish appropriate safety and health practices. For hazard information and guidance refer to the material safety data sheets (MSDS) of any chemicals used in this procedure. All applicable safety precautions must be observed for the use of compressed gas cylinders.

Appendix 2

Standard Operating Procedure For Cleaning Silco™ Canisters

Northern Laboratory Branch
Monitoring and Laboratory Division
CALIFORNIA AIR RESOURCES BOARD

SOP MLD SAS P1, Version 1.0
PESTICIDE SUPPORT PROGRAM

STANDARD OPERATING PROCEDURE FOR CLEANING SILCO™ CANISTERS

APPROVED BY:
Michael P. Spears, Manager
Special Analysis Section

November 15, 2000

DISCLAIMER: Mention of any trade name or commercial product in this Standard Operating Procedure does not constitute endorsement or recommendation of this product by the Air Resources Board (ARB). Specific brand names and instrument descriptions listed in the Standard Operating Procedure are for equipment used by the ARB laboratory.

1 INTRODUCTION

This document describes a method for cleaning six (6)-liter Silco™ canisters used for ambient air sampling of pesticides. The procedure is used to evacuate and pressurize individual canisters or groups of canisters in a heated oven.

2 SUMMARY OF METHOD

This method is based on EPA Method TO-14A. Up to eight (8) 6-liter canisters are connected to a manifold in an oven and evacuated to less than –30 inches of mercury. The canisters are heated to 70 degrees centigrade and purged four times with humidified ultrapure nitrogen. The purge cycling is from –30 inches mercury (Hg) to 25 pounds per square inch gauge (psig). Each cycle is 24 minutes (12 minutes vacuum and 12 minutes pressure). Both manual and automated procedures are provided. A liquid nitrogen cold trap on the vacuum line prohibits back-diffusion of the vacuum pump oil vapor and prevents water vapor from entering the vacuum pump.

3 INTERFERENCES AND LIMITATIONS

3.1 Canisters used for standards or controls may need reconditioning on a regular basis.

3.2 Canisters containing high pesticide concentrations may require more than one cleaning session to meet specified contamination criteria.

4 APPARATUS

4.1 Stainless steel tubing, ¾ inch

4.2 Duo-Seal, two stage, vacuum pump, Edwards.

4.3 Stabil-Therm Electric Oven, Pro-Tronix-11.

4.4 Dewar, cylindrical, 1600 ml capacity, 80 mm ID, Kontes KM-611410-2116.

4.5 Valves, 1/2" Varian, Model # L8732-301

4.6 Safety glasses and cryogenic gloves

4.7 Valco Instruments Company Inc., Digital Valve Sequence Programmer

4.8 Humidifier Canister, a 6L SilcoCan™ canister filled with ≥500 ml of organic free distilled water (HPLC grade).

5 MATERIALS

5.1 Grade five ultra pure compressed nitrogen.

5.2 Liquid nitrogen.

5.3 HPLC grade water.

6 SAFETY

6.1 Do not pressurize the canisters to more than 30 psig.

6.2 Keep the liquid nitrogen dewar filled whenever the vacuum pump is running.

6.3 Do not allow trapped vacuum vapors to move into the clean part of the system.

6.4 Check vacuum pump oil level periodically. Change oil every six months.

6.5 The humidifying system (system bubbler) should always contain at least 500 ml of water for proper canister humidifying.

6.6 The nitrogen cylinder should be changed whenever the cylinder pressure drops below 500 psig.

7 PROCEDURE

7.1. Vent all canisters in the hood.

7.2. Record canister number, sample number, date, and the canister designated as the batch quality control check (QA) in the Can Cleaning Logbook.

7.3. Fill dewar with liquid nitrogen.

7.4. Load canisters in the oven, attaching to the manifold and tighten so canisters do not rotate. Make certain the canister valves are open and the QC sample is easily reached.

7.5. Set oven heater to no more then 70 degrees centigrade, turn on heater and close the oven doors.

7.6. If cleaning less than eight (8) canisters the unused ports must be capped.

7.7. Turn on the vacuum pump, open the nitrogen tank and valves located on top of the humidifying canister. Set the nitrogen tank's second stage regulator between 20 and 25 psig.

7.8. Purging Cycle Timer usage

7.8.1 The Valco instrument timers are located on the top of the canister-cleaning oven. Two black boxes make up the complete timing system.

7.8.2 The upper box is used to set the cycle times and to set manual or automatic mode.

7.8.3 Each purge cycle will last for 24 minutes, 12 minutes for evacuating and 12 minutes for pressurizing.

7.8.4 The total cleaning process is a minimum of four purging cycles or a total of 96 minutes.

7.8.5 Set digital switches above light one and light two to 12 minutes (See Figure 1). These represent the evacuating and pressurizing cycle times respectively. The digital switches associated with lights 3 and 4 are set to zero.

7.8.6 The toggle switches located above mx.1 are set to "m" (minutes) for the lights 1 and 2 and set to "s" (seconds) for lights 3 and 4 (See Figure 1).

7.8.7 The lower box is used to set the total cycle time. The number of purging cycles needed determines this. If using four purging cycles then the total time is set to 96 minutes.

7.8.8 The digital switches on the lower box should be set as follows for a purging cycle of 96 minutes: 1, 96, 0, 1, or 1,48,48,0.

7.8.9 Digital switches associated with lights 1 and 4 are used to turn on and turn off the automatic timing sequence while switches associated with lights 2 and 3 are set for total time. Each digital switch is set from 0 to 99 minutes. Therefore the maximum possible time is 198 minutes.

7.9 After the upper and lower boxes have been set, press the auto button on the upper timer (See Figure 1). The auto light should come on.

7.10 Press the run button on the lower timer (See Figure 1). The first light (1) should light briefly and then switch to light 2. The system will evacuate to –30 inches Hg for 12 minutes.

7.11 Be sure to check the in-line pressure gauge to make certain the system is operating correctly.

7.12 At this point the system will switch between vacuum and pressure automatically ending the purging cycle with the canisters being under vacuum (-30 inches Hg).

7.13 The canister cleaning system can be manually operated.

7.13.1 Proceed with loading the oven as stated above.

7.13.2 Set the upper box to the desired cycle times.

7.13.3 Using the advance button, activate either the vacuum cycle or pressure cycle.

7.13.3.1 The lights for digital timers 1 and 2 will light indicating which cycle is being used. Also monitoring the pressure gauge will indicate what cycle is being used.

7.13.3.2 Repeat this cycle three (3) times. On the last pressurization cycle, close the valve on the canister to be used as the QC check.

7.14 Perform a final canister evacuation, then close the remaining canister valves.

7.15 Turn off the vacuum pump, close the humidifier valves, and shut off the compressed nitrogen tank.

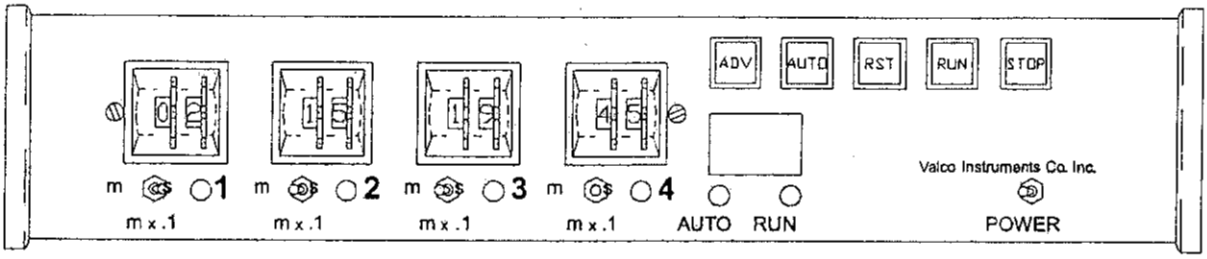
7.16 Turn off the canister oven heater, allow the canisters to cool to room temperature and then remove the canisters.

7.17 Give the QC check canister to the instrument operator for analysis.

7.18 Place the remaining unchecked canisters on the shelf located immediately next to the canister-cleaning oven.

7.19 After the canisters have been determined to be clean the field sampling sheets are photocopied. One copy is given to the project manager while one copy is placed in the field sampling sheet binder.

FIGURE 1



Revision History

Version	Date	Changes
1.0	November 15, 2000	Initial Version

Appendix 3

Mass Selective Detector Autotune Criteria

Mass Selective Detector Autotune Criteria

A standard autotune routine is performed on the mass selective detector (MSD) each day prior to sample analysis. The autotune report is evaluated for the following:

1. An unusual change in electron multiplier voltage
2. Peak width for tune masses should be between 0.4 amu and 0.6 amu
3. The relative abundance of tune mass 219.0 should be greater than 30% of tune mass 69.0.
4. Isotope abundance ratio for mass 70.0 should be between 0.54% and 1.6%. Isotope abundance ratio for tune mass 220.0 should be between 3.2% and 5.4%.
5. Air leaks in the GC/MS system are checked by evaluating the levels of masses 28 and 18 (nitrogen and water).

If autotune criteria are not met the system should be evaluated for problems. After all system problems are resolved, the detector should be autotuned before sample analysis. File the autotune reports in the instrument autotune folder.

Appendix 4

Calibration Standard Preparation for Bromomethane and 1,3-Dichloropropene

Calibration Standard Preparation for Bromomethane and 1,3-Dichloropropene
MSD-4

The certified stock gas used for calibration during this study was purchased from Scott Specialty Gases and has the following specifications:

Cylinder No AAL 2013	
BROMOMETHANE	13.1 PPB/M
CIS 1,3-DICHLOROPROPENE	5.05 PPB/M
TRANS 1,3-DICHLOROPROPENE	4.53 PPB/M

Working analysis standard is prepared by diluting the stock gas using the following procedure.

1. A six-liter Silco canister is evacuated to –30 " Hg.
2. 300 ml of stock gas is transferred to the canister using a gas tight syringe.
3. 100 ul of reagent grade water is added to the canister using a syringe and syringe adapter.
4. The canister is pressurized to 29.4 psig with ultra pure nitrogen.

The canister will contain analytes at the following concentrations:

BROMOMETHANE	0.847 ug/m3
CIS 1,3-DICHLOROPROPENE	0.382 ug/m3
TRANS 1,3-DICHLOROPROPENE	0.343 ug/m3

The standard sample injection is 400 ml. A calibration curve is generated by using the cryo sampler to introduce the following volumes of working standard to the GCMS.

Volume	bromomethane	cis 1,3-DCP	trans 1,3-DCP
400 ml	0.847 ug/m3	0.382 ug/m3	0.343ug/m3
200 ml	0.423 ug/m3	0.191 ug/m3	0.171 ug/m3
100 ml	0.212 ug/m3	0.095 ug/m3	0.086 ug/m3
50 ml	0.106 ug/m3	0.048 ug/m3	0.043 ug/m3
25 ml	0.053 ug/m3	0.024 ug/m3	0.021 ug/m3
15 ml	0.032 ug/m3	0.014 ug/m3	0.013 ug/m3

Calibration Standard Preparation for Bromomethane and 1,3-Dichloropropene
MSD-3

The certified stock gas used for calibration during this study was purchased from Scott Specialty Gases and has the following specifications:

Cylinder No AAL 2013	
BROMOMETHANE	13.1 PPB/M
CIS 1,3-DICHLOROPROPENE	5.05 PPB/M
TRANS 1,3-DICHLOROPROPENE	4.53 PPB/M

Working analysis standard is prepared by diluting the stock gas using the following procedure.

5. A six-liter Silco canister is evacuated to –30 " Hg.
6. Approximately 4900 ml of stock gas is transferred to the canister using a gas tight syringe, or by measuring canister pressure (pressurize to approximately –6.0" Hg).
7. 100 ul of reagent grade water is added to the canister using a syringe and syringe adapter.
8. The canister is pressurized to approximately 15 psig with ultra pure nitrogen.

The canister will contain analytes at approximately the following concentrations:

BROMOMETHANE	20 ug/m3
CIS 1,3-DICHLOROPROPENE	8.8 ug/m3
TRANS 1,3-DICHLOROPROPENE	8.0 ug/m3

The standard sample injection is 400 ml. A calibration curve is generated by using the cryo sampler to introduce the following volumes of working standard to the GCMS.

Volume	bromomethane	cis 1,3-DCP	trans 1,3-DCP
400 ml	20.0 ug/m3	8.8 ug/m3	8.0 ug/m3
200 ml	10.0 ug/m3	4.4 ug/m3	4.0 ug/m3
100 ml	5.0 ug/m3	2.2 ug/m3	2.0 ug/m3
50 ml	2.5 ug/m3	1.1 ug/m3	1.0 ug/m3
25 ml	1.25 ug/m3	0.55 ug/m3	0.50 ug/m3
15 ml	0.75 ug/m3	0.33 ug/m3	0.30 ug/m3

APPENDIX III

DPR's
AIR MONITORING RECOMMENDATIONS FOR
METHYL BROMIDE AND 1,3-DICHLOROPROPENE

dpr Department of Pesticide Regulation

Paul E. Helliker
Director

MEMORANDUM

Gray Davis
Governor

Winston H. Hickox
Secretary, California Environmental Protection Agency

TO: Jeff Cook, Chief
Air Resources Board
Monitoring and Laboratory Division
Quality Management Branch
PO Box 2815
Sacramento, California 95812

FROM: John S. Sanders, Ph.D., Chief
Environmental Monitoring Branch
(916) 324-4100

John S. Sanders

DATE: July 25, 2001

SUBJECT: UPDATED MONITORING RECOMMENDATIONS FOR 2001

As recently discussed, the Department of Pesticide Regulation (DPR) would like to modify and clarify its recommendations for monitoring in 2001. First, DPR is withdrawing its request for the Air Resources Board (ARB) to conduct application-site monitoring of structural fumigations this year, including both field sampling and laboratory analysis. However, DPR may request this monitoring in future years.

Second, application-site monitoring for field fumigations should be conducted at 20 meters from the edge of the fumigated area, or the buffer zone distance required for the fumigation, whichever is greater. The size of the buffer zone will vary with method of application, number of acres, and application rate. In addition, individual county agricultural commissioners may adjust the buffer zones recommended by DPR for local conditions. ARB staff should consult with the agricultural commissioner in the county where monitoring will occur to determine the buffer zone size for a specific fumigation. In the case of methyl bromide/chloropicrin fumigations, an outer buffer zone distance and an inner buffer zone distance are specified. Monitoring should occur at the outer buffer zone distance, since this is the buffer zone that pertains to nearby residents. County agricultural commissioners may or may not require buffer zones for metam-sodium fumigations.

All other monitoring recommendations still apply, as described in the enclosed document. If you have any questions, please feel free to contact Randy Segawa at (916) 324-4137, or contact me.

Enclosure

cc: Randy Segawa, DPR
Ron Oshima, DPR
Lynn Baker, ARB

Staff Report

Use Information and Air Monitoring Recommendations for Field Fumigations with the Pesticide Active Ingredients 1,3-Dichloropropene, Chloropicrin, Metam Sodium, and Methyl Bromide

May 2001

By
Johanna Walters
Environmental Research Scientist,
and
Pam Wales
Associate Information Systems Analyst

ENVIRONMENTAL HAZARDS ASSESSMENT PROGRAM

STATE OF CALIFORNIA
Environmental Protection Agency
Department of Pesticide Regulation
Environmental Monitoring Branch
1001 I Street
Sacramento, California, 95814

USE INFORMATION AND AIR MONITORING RECOMMENDATION FOR FIELD FUMIGATIONS WITH THE PESTICIDE ACTIVE INGREDIENTS 1,3-DICHLOROPROPENE, CHLOROPICRIN, METAM SODIUM, AND METHYL BROMIDE

A. BACKGROUND

This recommendation contains general information regarding the physical-chemical properties and the historical uses of 1,3-dichloropropene, chloropicrin, metam sodium, and methyl bromide. The Department of Pesticide Regulation (DPR) provides this information to assist the Air Resources Board (ARB) in their selection of appropriate locations for conducting pesticide air monitoring operations.

1,3-Dichloropropene

Table 1 describes some of the physical-chemical properties of 1,3-dichloropropene.

Table 1. Some Physical-Chemical Properties of 1,3-Dichloropropene[1].

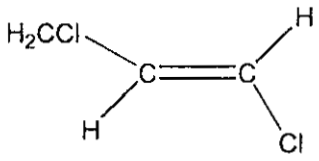
Chemical name	(*EZ*)-1-3-dichloropropene
Common name	1,3-dichloropropene
Some tradenames[†]	Telone II, Tri-Form
CAS number	542-75-6
Molecular formula	$C_3H_4CL_2$
Molecular weight	111.0
Form	Colorless-to-amber liquid with sweet penetrating odor (Tomlin, 1997)
Solubility	Water: 2.18 g/L at 20°C
Vapor pressure	34.3 mmHg at 25°C
Henry's Law Constant (KH)	2.29 X 10^{-3} at 25°C
Soil adsorption Coefficient (Kd)	0.391
Aerobic soil metabolism half-life	11.5 to 53.9 days
Anaerobic soil metabolism half-life	2.5 days at 25°C (Tomlin, 1997)

[1] Data from Kollman and Segawa, 1995

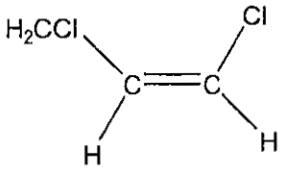
The technical product is a mixture of approximately equal quantities of (*E*)- and (*Z*)- isomers (figures 1a and 1b), of which the (*Z*) isomer is more nematicidally active The chemical is phytotoxic to plants and is rapidly metabolized to normal plant constituents. In soil, 1,3-dichloropropene undergoes hydrolysis to the respective 3-chloroallyl alcohols and is considered non-persistent (Tomlin, 1997).

[†] Disclaimer: The mention of commercial products, their source, or their use in connection with material reported herein is not to be construed as either an actual or implied endorsement of such products.

Figure 1. The Chemical Structures of the 1,3-Dichloropropene Isomers.



(a) E-1-3-dichloropropene



(b) Z-1-3-dichloropropene

1,3- Dichloropropene is reported to hydrolyze to 3-chloro-2-propen-1-ol, which may be biologically oxidized to 3-chloropropenoic acid (Montgomery, 1997). Breakdown of this chemical eventually yields carbon dioxide (Connors *et al.*, 1990). Chloroacetaldehyde, formyl chloride, and chloroacetic acid are formed from the ozoneation of 1,3-dichloropropene at 25°C and 730 mmHg (Tuazon *et al.*, 1984).

1,3-Dichloropropene has an LC_{50} (96 hour) of 3.9 mg/L for rainbow trout and 7.1 mg/L bluegill sunfish and an oral and contact LD_{50} (90 hour) of 6.6 µg/bee (Tomlin, 1994).

Chloropicrin

Table 2 describes some of the physical-chemical properties of chloropicrin.

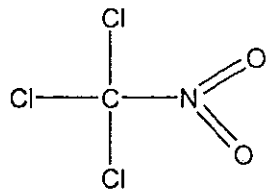
Table 2. Some Physical-Chemical Properties of Chloropicrin[1].

Chemical name	trichloronitromethane
Common name	Chloropicrin
Some tradenames	Chlor-O-Pic
CAS number	76-06-2
Molecular formula	CCl_3NO_2
Molecular weight	164.4
Form	Colorless liquid with a lachrymatory action (Tomlin, 1997).
Solubility	Water: 2.00 g/L at 25°C
Vapor pressure	23.8 mmHg at 25°C
Henry's Law Constant (KH)	2.51×10^{-3} at 25°C
Soil adsorption Coefficient (Kd)	0.139- 0.311
Aerobic soil metabolism half-life	.374- 5.13 days

[1] Data from Kollman and Segawa, 1995

Chloropicrin (figure 2) moves rapidly in soils within twelve inches of injection, but may diffuse to maximum of four feet in sandy soil (EXTOXNET, 1996). Chloropicrin is metabolized in soils by sequential reductive dechlorination (Mongomery, 1997). The end products are thought to be nitromethane and small amounts of carbon dioxide. Since it is only slightly soluble in water, chloropicrin will not move rapidly into aquatic environments. Chloropicrin has a higher density than water and will tend to sink to the bottom of surface water. Chloropicrin photodegrades to carbon dioxide, bicarbonate, chloride, nitrate, and nitrite with a half-life of 31.1 hours (EXTOXNET, 1996).

Figure 2. The Chemical Structure of Chloropicrin.



Chloropicrin

Chloropicrin vapor is heavier than air and spreads along the ground (Howard, 1991). It is efficiently photolyzed in the atmosphere to phosgene, nitric oxide, chlorine, nitrogen dioxide, and dinitrogen tetroxide (EXTOXNET, 1996; Mongomery, 1997). When chloropicrin is heated to decomposition, toxic fumes of nitrogen oxides and chlorine are released (Montgomery, 1997).

Chloropicrin is toxic to fish with an LC_{50} (96 hour) of 0.0765 mg/L for rainbow trout and 0.105 mg/L bluegill sunfish. It is nontoxic to bees when used as recommended (Tomlin, 1997).

Metam sodium

Table 3 describes some of the physical-chemical properties of metam sodium.

Table 3. Some Physical-Chemical Properties of Metam Sodium[1].

Chemical name	Sodium methyldithiocarbamate
Common name	Metam sodium
Some tradenames	Vapam
CAS number	137-42-8
Molecular formula	$C_2H_4NNaS_2$
Molecular weight	129.2
Form	Colorless crystalline dihydrate (The Agrochemicals Handbook, 1991).
Solubility	Water: $9.6x10^4$ g/L at 25°C

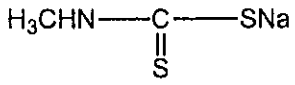
Vapor pressure	Nonvolatile (The Agrochemicals Handbook, 1991).
Aerobic soil metabolism half-life	1.6×10^{-2} days
Anaerobic soil metabolism half-life	<1 day

[1] Data from Kollman and Segawa, 1995

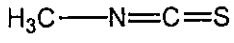
Metam sodium (figure 3a) is a soil fumigant, which acts by decomposition to methyl isothiocyanate (MITC) (figure 3b) with a DT_{50} of 23 minutes to 4 days when in contact with moist soil (Tomlin, 1997). While metam-sodium is non-volatile, MITC has a relatively high vapor pressure (16.0 mmHg at 25°C) and leaves the soil primarily due to volatilization (Leistra and Crum, 1990). Factors affecting the volatilization rate of MITC from soils include: soil temperature, soil type, soil pH, and soil moisture content (Ashley *et al.*, 1963).

In air, the primary MITC transport and transformational pathway is gas phase photolysis. In laboratory experiments, using ambient solar radiation, MITC half-lives ranged from 29 to 39 hours and resulted in the production of methyl isocyanide, methyl isocyanate (MIC) (figure 3c), methylamine, N-methyl formamide, sulfur dioxide, hydrogen sulfide (figure 3d), and carbonyl sulfide (figure 3e). Research suggests that MIC may be the major stable photoproduct formed in the atmosphere (Geddes *et al.*, 1995; Alvarez and Moore, 1994).

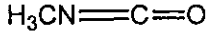
Figure 3. The Chemical Structures of Metam Sodium and its Breakdown Products of Concern.



(a) Metam sodium



(b) Methyl isothiocyanate (MITC)



(c) Methyl isocyanate (MIC)

(d) Hydrogen sulfide

(e) Carbon disulfide

The decomposition of metam sodium results in low concentrations of two other highly volatile decomposition products: hydrogen sulfide (H_2S) and carbon disulfide (CS_2). The dominant reactions of H_2S and CS_2 in the atmosphere are by daytime reaction with the OH radical. Calculated half-lives of H_2S and CS_2 are 2.5 days and approximately 2 weeks, respectively (Atkinson *et al.*, 1997; Hein *et al.*, 1997).

Metam sodium is toxic to fish with an LC_{50} (96 hour) of 0.079 mg/L for rainbow trout and 0.39 mg/L bluegill sunfish. It is nontoxic to bees when used as recommended (Tomlin, 1997).

Methyl Bromide

Table 4 describes some of the physical-chemical properties of methyl bromide.

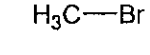
Table 4. Some Physical-Chemical Properties of Methyl Bromide[1].

Chemical name	Bromomethane
Common name	Methyl bromide
Some tradenames	Metabrom, Terr-O-Gas 75
CAS number	74-83-9
Molecular formula	CH_3Br
Molecular weight	94.9
Form	Non-flammable, colorless, odorless gas at room temperature (Tomlin, 1997).
Solubility	Water: 13.4 g/L at 25°C
Vapor pressure	$1.7x\ 10^3$ mmHg
Henry's Law Constant (KH)	$1.59x10^{-2}$ (calculated value)
Soil adsorption Coefficient (Kd)	3.45- 9.4
Aerobic soil metabolism half-life	.15- 17 days
Anaerobic soil metabolism half-life	1.63- 6.0 days

[1] Data from Kollman and Segawa, 1995

Methyl bromide (figure 4) readily evaporates at temperatures normally encountered during fumigation, but some of the chemical may become entrapped in soil microspores following application (EXTOXNET, 1996). Transformation of methyl bromide to bromide increases as the amount of organic matter in the soil increases. Methyl bromide hydrolyzes in water forming methane and hydrobromic acid with an estimated hydrolysis half-life of 20 days at a water temperature of 25°C and pH 7 (Montgomery, 1997).

Figure 4. The Chemical Structure of Methyl Bromide.



methyl bromide

Methyl bromide is moderately toxic to fish with an LC_{50} (96 hour) of 3.9 mg/L. It is nontoxic to bees when used as recommended (Tomlin, 1997).

B. CHEMICAL USES

1,3-Dichloropropene

As of December 2000, thirteen products containing 1,3-dichloropropene were registered for use in California. 1,3-dichloropropene is a multi-purpose liquid fumigant used to control nematodes, wireworms, and certain soil borne diseases in cropland. It is used for pre-planting control of most species of nematode in deciduous fruit and nuts, citrus fruit, berry fruit, vines, strawberries, hops, field crops, vegetables, tobacco, beet, pineapples, peanuts, ornamental and flower crops and tree nurseries. It also has secondary insecticidal and fungicidal activity (Tomlin, 1994).

In California's agricultural setting, growers primarily use 1,3-dichloropropene on carrots, sweet potatoes, potatoes, wine grapes, and for preplant soil preparation. 1,3-dichloropropene recommended label use rates range from 85 to 522 pounds active ingredient (AI) per acre depending on soil type or texture for a broadcast application and 2 to 12 pounds AI per 1000 feet of row per outlet depending on soil type or texture.

The 1,3-dichloropropene product label offers several methods for application, including: broadcast (using chisel, offset swing shank, Nobel plow or plow-sole application equipment) and row application. Immediately after application, the soil must be "sealed" to prevent fumigant loss and to ensure that an effective concentration of fumigant is maintained within the soil for a period of several days. Sealing for a broadcast treatment can be accomplished by uniformly mixing the soil to a depth of 3 to 4 inches to eliminate chisel or plow traces. Sealing for row treatments can be accomplished by disrupting the chisel trace using press sealers, ring rollers, or by reforming the beds and following with such equipment. Application of a non-perforated plastic film can improve sealing but does not do away with the need to eliminate chisel traces. 1,3-dichloropropene is available as a liquid fumigant, is a restricted use pesticide due to its high acute inhalation toxicity and carcinogenity, and includes the Signal Word "Warning" on the label.

Chloropicrin

As of December 2000, forty-seven products containing chloropicrin were registered for use in California. Chloropicrin is primarily used as a preplant soil fungicide to control root-attacking pathogens and for the control of nematodes, insects and weed seeds. It is also used as a fumigant for stored cereals and grains, to treat wood poles and timber for internal decay, and as a warning agent for odorless structural and soil fumigants.

In California's agricultural setting, chloropicrin is mainly used on strawberries, preplant soil application, tomatoes, and outdoor grown transplants. According to the label for Chlor-O-Pic® (which contains 99% of active ingredient), chloropicrin's primary use is for control or suppression of plant parasitic causing organisms including nematodes, the bacterial pathogen *Pseudomonas solanacearum*, fungi in the genera *Cylindrocladium*, *Fusarium*, *Phytophthora*, *Pyrenochaeta*, *Ptythium, Rhizoctonia*, *Sclerotium*, and *Verticillium*, the clubroot organism *Plasmodiophora*, and the soil pox organism *Actinomyces ipomoea*. Control of certain soil-infesting insects such as cutworms, grubs, and wireworms may also be obtained as well as suppression of weeds if used

with a tarpaulin. The label gives soil fumigation rates of 148.5 to 495 pounds AI per acre depending on soil and crop; dosage is reduced by 33% if area is covered by a plastic tarp immediately after application. Fumigations should take place at least 14 days prior to planting whenever soil conditions are suitable. Soil should be tilled to a fine, loose condition with a temperature between 60°F and 85°F for best results. For space fumigations the label suggests rates of 0.35 to 0.69 pounds AI per 1000 cubic feet for empty potato cellars, houses, and storages, and 2 to 4 pounds AI per 1000 square feet for empty grain bins.

The chloropicrin product label offers several methods for application including: overall field treatment using a chisel type applicator, row or bed treatment, and probe type point injection for small areas or volumes. The label recommends sealing the field with a plastic tarp or by the use of drag, cultipacker, roller, or float to firm the soil surface immediately behind chisels. Chloropicrin is a restricted use pesticide due to its acute toxicity and includes the Signal Word "Danger" on the label.

Metam Sodium

As of December 2000, twenty-six products containing metam sodium were registered for use in California. Metam sodium is a soil fumigant that acts by decomposition to methyl isothiocyanate, which is phytotoxic to all green plants (The Agrochemicals Handbook, 1991). It is used as a soil sterilant that is applied prior to planting edible crops and controls soil fungi, nematodes, weed seeds, and soil insects.

Metam sodium is used in California mainly on carrots, processing/canning tomatoes, potatoes, and cotton. It is recommended for the suppression or control of soil-borne pests that attack ornamental, food, and fiber crops, weeds and germinating weed seeds such as chickweed, dandelions, pigweed, etc., and soil-borne diseases such as *Rhizoctonia*, *Pythium*, *Phytophthora*, etc. Nematode suppression is achieved when metam sodium converts to MITC and makes contact with active forms of the nematode, preferable juveniles. The label suggests that pre-irrigation may induce some species eggs to hatch and enhance overall performance. Metam sodium recommended label use rates range from 159 to 318 pounds AI per acre depending on crop, target pest, and soil properties. The metam sodium product label recommends sealing the soil at the time of application. Sealing methods include applying a water seal by sprinkler irrigation, tarping, or packing soil with a roller drag, or press wheel.

The metam sodium product label offers several methods for application, including: chemigation (using only those sprinkler systems which deliver large water droplets to prevent excessive loss), soil injection (using shanks, blades, fertilizer wheels, plows, etc.), and by use of rotary tiller or power mulcher. Metam sodium is available as a water-soluble liquid and includes the Signal Word "Danger" on the label.

Methyl Bromide

As of December 2000, fifty-four products containing methyl bromide were registered for use in California. Methyl bromide is a multi purpose fumigant used for insecticidal, acaricidal, and

rodenticidal control in mills, warehouses, grain elevators, ships, etc., stored products, soil fumigations, greenhouses, and mushroom houses. In field fumigations it is used to treat a wide range of insects, nematodes, soil-borne diseases, and seed weeds.

In California's agricultural setting, growers primarily use methyl bromide on strawberries, preplant soil preparation, outdoor container/field grown plants, and outdoor grown transplants. Methyl bromide recommended label use rates range from 1 to 20 pounds AI per 1000 cubic feet for non-food products, 0.2-9 pounds AI per 1000 cubic feet for structures associated with raw or processed commodities, 1 to 2 pounds AI per 1000 cubic feet for processed foods, and 1.5 to 9 pounds AI per 1000 cubic feet for raw agricultural commodities. The methyl bromide product label recommends use rates of 1.5 to 3 pounds AI per 100 cubic feet for almonds and strawberries and 2 to 4 pounds AI 100 cubic feet for sweet potatoes (where fumigations below 70°F may result in damage). The label for methyl bromide also lists tolerances (ppm) and exposure times for raw agricultural commodities and processed foods. For structures and non-food products exposure times are listed. For field applications of methyl bromide, the label suggests waiting two weeks after the exposure period before introducing transplants or vegetative plant parts and waiting 96 hours before planting crop seeds. Methyl bromide is odorless, except at high concentrations, and is generally used with a warning agent such as chloropicrin.

The methyl bromide product labels offer several methods for application, including: chamber and vault fumigation, vacuum chamber fumigation, tarpaulin fumigation, warehouse, grain elevator, food processing plant, restaurant and other structures containing commodities, and shipboard fumigations. Methyl bromide is available as a gas fumigant, is a restricted use pesticide due to its acute toxicity, and includes the Signal Word "Danger" on the label.

Pesticide Use Summary

With DPR's implementation of full pesticide use reporting in 1990, all users must report the agricultural use of any pesticide to their county agricultural commissioner, who subsequently forwards this information to DPR. DPR compiles and publishes the use information in the annual Pesticide Use Report (PUR). Because of California's broad definition for agricultural use, DPR includes data from pesticide applications to parks, golf courses, cemeteries, rangeland, pastures, and rights-of-way, postharvest applications of pesticides to agricultural commodities, and all pesticides used in poultry and fish production, and some livestock applications in the PUR. DPR does not collect use information for home and garden use, or for most industrial and institutional uses. The information included in this monitoring recommendation reflects widespread cropland applications of 1,3-dichloropropene, chloropicrin, metam sodium, and methyl bromide. Use rates were calculated by dividing the total pounds of each chemical used (where the chemical was applied to acreage) by the total number of acres treated.

According to the PUR, the total amount of 1,3-dichloropropene, chloropicrin, metam sodium, and methyl bromide used in California from 1996 to 1999 has ranged annually between slightly under 30,000,000 to over 33,000,000 pounds (Table 5). The majority of California's total use of these chemicals occurred in five counties—Kern, Fresno, Monterey, Imperial, and Ventura. On average the total use for the 15 counties with the highest use accounted for 85% of the total use in

California. Tables 6 through 9 display 1,3-dichloropropene, chloropicrin, metam sodium, and methyl bromide use for each county with use for the years 1996- 1999.

In California, growers use 1,3-dichloropropene primarily to control nematodes in carrots, sweet potatoes, preplant soil application and potatoes (Table 10). Chloropicrin is generally used on strawberries, preplant soil applications, outdoor grown transplant/ propagative material, and tomatoes (Table 11). Metam sodium use is dominated by use on carrots, tomatoes, potatoes, and cotton (Table 12). Methyl bromide is used primarily on strawberries, preplant soil applications, and outdoor container/ field grown plants (Table 13). 1,3-dichloropropene is used primarily in March October, and November; chloropicrin and methyl bromide are primarily used in August, September, and October; and metam sodium is used most in July, August, and September (Table 14). Use of these chemicals is difficult to predict as disease and nematode pressure is somewhat dependent on weather and other factors, such as cultural practices. However, assuming that no significant changes in weather occur, use is not expected to change.

Table 5. Annual Cropland Use of 1,3-Dichloropropene, Chloropicrin, Metam Sodium, and Methyl Bromide by County (Pounds Of Active Ingredient)

County	1996	1997	1998	1999	Total
KERN	6,179,916	6,343,794	5,078,461	6,538,208	24,140,379
FRESNO	5,322,191	4,424,105	3,436,569	4,927,546	18,110,410
MONTEREY	3,672,813	3,856,405	3,924,679	4,015,262	15,469,159
IMPERIAL	2,698,543	3,060,034	3,985,985	3,329,458	13,074,021
VENTURA	1,937,362	1,933,891	2,294,369	2,925,988	9,091,609
SANTA BARBARA	1,677,888	1,644,438	1,951,895	2,284,290	7,558,511
MERCED	2,206,557	1,893,274	1,676,518	1,717,253	7,493,602
RIVERSIDE	1,067,009	1,007,764	1,577,736	1,681,653	5,334,162
SANTA CRUZ	1,186,142	1,217,192	1,380,775	1,274,695	5,058,804
STANISLAUS	1,139,627	1,221,184	1,006,163	933,860	4,300,835
TULARE	932,252	1,591,740	658,930	901,350	4,084,272
SAN JOAQUIN	1,053,285	1,143,267	929,413	825,832	3,951,797
LOS ANGELES	540,509	944,109	619,267	884,220	2,988,105
ORANGE	680,472	657,943	762,424	743,593	2,844,432
KINGS	603,013	616,537	664,186	741,837	2,625,573
Total for Top 15 Counties	30,899,575	31,557,674	29,949,368	33,727,044	126,125,671
Percent of CA Total	85	84	86	85	85
Total Statewide Use	36,424,497	37,492,647	34,652,786	39,843,109	148,413,039

Table 6. 1,3-Dichloropropene Use by County for the Years 1996-1999

COUNTY	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
ALAMEDA			1,498									
AMADOR					5,256							
BUTTE	4,580		3,766					5,111	31,828	9,037	21,953	5,642
COLUSA							4,381					
DEL NORTE							6,967	86,982				
EL DORADO			5									
FRESNO	43,007	75,950	113,535	27,590	13,833	21,374	8,774	31,820	98,265	174,382	371,827	42,808
GLENN												2,522
HUMBOLDT								248	11,279			
IMPERIAL	149,875	36,382	25,195				11,986	38,980	335,458	350,040	97,612	75,791
KERN	103,715	302,427	126,199	36,105	24,765	126,468	723,419	330,359	28,453	268,253	433,043	220,902
KINGS		13,692	27,816	9,719			52,702	11,476	19,113		18,247	5,343
LOS ANGELES	33		300					214	6	19		
MADERA	24,637	41,270	208,790	8,736		9,125					70,258	14,694
MARIN		12										
MENDOCINO										2		
MERCED	17,310	14,968	210,787	120,867	61,943			117	7,254	22,753	238,342	133,959
MODOC				45,362								
MONO				558								
MONTEREY	89,811	68,411	76,629	145,516	247,023	133,280	67,073	31,337	53,952	132,997	242,415	77,919
ORANGE				1			396	400	278			
PLACER				5,783	13,821	5,913		23,211	3,066	6	3	
RIVERSIDE	2,046		14,874			3,344	706	15,457	5,071	22,927		
SACRAMENTO					6,339					7,235	3,460	
SAN BENITO	3,043			4,987		8,972	2,428	161	2,623	18,014	37,671	5,277
SAN DIEGO	6	1,820	3	403	2	1,017	4	1	613			2
SAN FRANCISCO						9						
SAN JOAQUIN	368	20,325	20,373	71,359	42,899	73,571	11,778	111	7,542	80,485	127,232	10,447
SAN LUIS OBISPO			3,076		39,153	806	721	3,038	502	1,480	19,453	2,705
SAN MATEO				1,951	19,489	5,859		717				
SANTA BARBARA	158	22,733	28,162	10,090	39,079	21,326	4	19,046	2	580	225	6,106
SANTA CLARA			5,323	518		233			2,537	4,341	12,738	
SANTA CRUZ		963	4,041	27,016	101,754	31,710	3,449	6,360	5,530	3,638	4,606	1,251
SHASTA				5,970				590				
SISKIYOU				115,464	6,037	3,129		560	5,692	7,023		
SOLANO		967	30	512	474				32		8,629	
SONOMA				9,345				5		6,970		
STANISLAUS	18,404	6,730	21,670	42,115	38,327		4,988	26,925	40,598	153,663	261,430	47,774
SUTTER			10,588	6,358	2,578			3,916	5,073	49,900	58,195	2,456
TEHAMA										1,497		
TULARE		4,265	27,143		3,936		7,385	11,863	54,682	157,153	146,275	36,403
VENTURA	1,591	11,507	43,212	30,858	30,752	3,476	1,397	22,074	1,663	1,074	11,094	5
YOLO	91		52	1,146					1,490	25,687	10	
YUBA				2,418						17,676	10,819	

Table 7. Chloropicrin Use by County for Years 1996-1999

COUNTY	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
ALAMEDA	25				118	62	177	7	55		21	1
AMADOR	35								1	94	40	28
BUTTE			18		209		1	1,823	4,335	1,402	1,411	
COLUSA					3		34					
CONTRA COSTA	1		1	1	1	140	1,350	919	376	253	1	
DEL NORTE				1			161	19,905	1,904			
EL DORADO	59		562	332	78			3,552	248			
FRESNO	19,771	7,019	10,841	3,551	1,322	15,810	31,603	11,538	19,276	27,829	19,673	8,804
GLENN			3,793	14,527								
HUMBOLDT						754		446	11,647			
IMPERIAL	393	74			1		5,779	2,907	16,397	24,393	4,380	786
INYO												
KERN	1,943	3,537	1,294	736	15,482	1,015	8,720	21,726	28,454	8,193	14,820	2,204
KINGS	388	299	278	134	29	22	438	102	46	1,658	714	248
LAKE							1	144	1	8		1
LASSEN		3,629	21,716	1,301				108,183	41,303	566		
LOS ANGELES	433	892	525	368	516	608	685	8,565	4,399	2,367	434	282
MADERA	77	89	189	81	135		361	212	83	111	96	207
MARIN	1	4	3	3	5	11	15	6	3	3	2	42
MARIPOSA									1			
MENDOCINO	26	1	2	1	19	1	12	236	174	270	75	1
MERCED	11,576	3,955	55,241	26,687	5,759	5,468	9,689	11,159	22,513	12,246	23,000	44,395
MODOC								15,258	6,341			
MONTEREY	3,708	1,010	11,473	4,622	63,502	189,448	361,720	700,335	1,325,125	1,226,486	300,647	3,714
NAPA	18			1	4	1	409	403	628	9,049	326	34
NEVADA			39				23					
ORANGE	7,139	14,311	8,166	18,913	16,977	11,232	55,921	300,906	157,995	4,327	2,839	17,762
PLACER			1	54	4,998	2,603		1,908	2,710	7	2	526
RIVERSIDE	16,980	38,290	185	151	75	176	3,427	5,110	2,292	578	9,968	11,759
SACRAMENTO	419	517	134	3,449	541	4,226	3,498	695	6	3,027	1,161	178
SAN BENITO	1,745		1,499	1,747	2,516	2,130	4,026	12,367	26,477	49,995	30,062	3,024
SAN BERNARDINO	13	12	20	352	30	24	23	687	13,830	6,220	24	19
SAN DIEGO	12,927	30,324	63,129	111,047	58,098	57,932	62,225	42,325	48,025	9,846	12,877	17,370
SAN FRANCISCO						2						
SAN JOAQUIN	3,225	49	26,462	78,440	21,936	3,077	2,697	8,095	8,579	7,584	7,494	1,466
SAN LUIS OPISBO	3,240	18,910	30,295	9,874	5,727	7,208	6,179	3,651	58,615	53,906	7,138	7,167
SAN MATEO	895	848	233	10	4,363	3,692	1,231	773	2,674	2,994	486	3
SANTA BARBARA	573	8,076	16,895	12,610	19,150	7,366	2,534	23,299	394,568	471,160	22,481	7,313
SANTA CLARA	8	105	1,959	3,151	81	8,825	11,214	161	18,014	32,384	6,840	591
SANTA CRUZ	1,670	2,160	8,028	7,280	14,840	25,311	64,872	263,473	624,088	517,447	82,408	3,649
SHASTA			7,787	13,022	3,491	6,087	30,853	119,441	42,772	4,068		
SOLANO			62,844	35,078	14			108,107	36,600	1,799		
SONOMA	1	21	658	1,760	12	42	2,036	5,618	557	750	459	36
STANISLAUS	5	3	7	5,370	115	140	410	3,815	1,640	3,055	1,869	6
SUTTER	2,700	468	2,107	542	18,339	5,877	7,355	13,303	100,667	20,992	9,738	1,124
TEHAMA		1	1	17	1,137	6	6,389	68,637	9,499	5,028	4,771	404
TEHEMA		910	7,421	25,511	8	3			1,692	1,360	1	19
TULARE	288	3,838	8,472	118	601	254	7,538	1,746	2,343	2,681	2,119	585
TUOLUMNE										61		
VENTURA	3,025	4,141	10,421	24,647	63,661	184,927	287,095	810,524	507,354	20,116	9,823	2,824

COUNTY	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
YOLO	20	3	1,047	1,127	14	4	509	1,518	1,104	23	12	
YUBA				1,516	1	1		599	20	574	43	16

Table 8. Metam Sodium Use by County for the Years 1996-1999

COUNTY	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
ALAMEDA	3,746	3,418	2,222	343	292	739	413	140	36	224	179	369
AMADOR				105	35		20					
BUTTE				382	231	527	14	1,955	2,006	1,202	723	1,286
CALAVERAS				16					57	39		18
COLUSA	23,253	8,642	52,046	17,206	2,559	1,305	8,515	21,287	17,089	678	1,839	585
CONTRA COSTA	1,152	1,252	7,450	130	119	5	1	479	3,050	6,454	14,498	840
DEL NORTE							89,100	308,811	4,741	2,275		
EL DORADO	1,881	2,250	1,607	1,633	553	1,212	823	350	1,292	1,601	1,614	2,491
FRESNO	3,209,066	1,933,125	4,385,620	852,082	88,634	30,482	299,853	32,594	30,857	201,418	860,837	1,402,770
GLENN		3,175		693	689	874		1,676		254	444	460
HUMBOLDT	19		225	43					38	272	159	
IMPERIAL	133,381	7,146	418	75,983	78	88,015	393,120	3,049,217	4,168,773	2,025,638	550,030	530,877
KERN	1,007,247	697,391	318,414	156,091	212,300	1,394,527	4,384,180	2,560,817	863,876	1,618,772	1,439,630	1,676,242
KINGS	274,520	180,583	377,715	260,333	112	123,098	348,509	286,362	8,206	42,796	48,768	19,876
LAKE			98	21						74		
LOS ANGELES	46,388	346,405	502,582	114,231	161,289	389	112	243	35,101	59,443	2,114	2,232
MADERA	7,721	69,285	12,671	12,987	1,181	2,999		20,303	58,226	21	24,533	33
MARIN	379	414	247	1	29		3	14	79	582	229	379
MARIPOSA												3
MENDOCINO	22	2,017	411		22				75	139	1,994	17
MERCED	10,879	12,320	537,011	1,090,252	291,407	15,806	12,326	70,511	55	32,032	603	574
MODOC			84,197	431,854	58,722				13,907	54,111	4,344	
MONO				169								
MONTEREY	24,457	40,078	23,550	52,838	153,011	29,389	35,936	46,975	106,644	99,752	56,520	27,675
NAPA	13	70	24					81	77	22		
NEVADA	58	58	463	717	865	1,704	1,613	1,615	617	1,694	1,186	775
ORANGE	10,499	37,506	1,228	36,936	56,485	64,954	5,096	28,980	123,048	2,421	500	6,952
PLACER	1,776	2,163	2,883	2,498	2,364	1,261	1,373	1,274	797	881	881	6,348
PLUMAS	41	140	137	169	13				25			
RIVERSIDE	166,297	113,192	98,121	101,174	139,605	245,581	237,119	310,911	199,406	93,034	63,004	94,166
SACRAMENTO	906	822	53,359	210,188	25,963	3,527	1,460	21,391	6,640	10,086	4,534	2,922
SAN BENITO	296	1,210	45,684	40,083	6,461	1,185	1,184	7,033	502	4,249	514	223
SAN BERNARDINO	2,048	2,353	2,709	5,080	7,663	16,300	12,701	3,248	11,009	1,303	714	53
SAN DIEGO	10,804	31,860	25,366	51,769	13,322	43,865	32,422	69,272	38,121	1,980	2,351	2,695
SAN FRANCISCO	91	31	8	8	644	2				643	964	309
SAN JOAQUIN	80	468	100,496	130,609	65,526	10,066	8,870	4,347	8,176	39,226	35,997	331
SAN LUIS OBISPO	47,410	118,797	334,208	187,917	143,256	148,856	40,903	30,098	32,761	43,902	61,781	20,709
SAN MATEO	2,642	3,683	10,012	51,041	67,407	37,403	5,405	3,604	4,808	8,043	2,475	3,959
SANTA BARBARA	137,962	83,023	217,270	550,752	685,178	326,559	265,287	198,043	319,700	121,060	129,810	85,923
SANTA CLARA	8,874	20,699	60,637	12,841	5,953	6,334	5,177	5,867	3,953	1,902	45,999	2,127
SANTA CRUZ		0		70,975	139,303	17,399	3,585	906	480	4,692	635	61

COUNTY	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
SHASTA	20	16	28	82	116	65	41	94	105	200	17	125
SIERRA	463	463	463	717	717				2	225	90	
SISKIYOU			15,584	259,049	3,807							
SOLANO	10,906	71,822	330,166	302,902	24,897	33,986	9,431	54,848	21,958	82,758	34,673	
SONOMA	3,306	1,978	3,333	10,004	18,861	32,076	37,062	5,004	3,086	1,001	1,615	2,200
STANISLAUS	3,325	18,698	135,727	298,651	82,015	33,840	61,951	65,148	81,682	68,419	14,635	7,621
SUTTER	141	14,220	87,278	53,061	15,349	678	801	5,406	680	652	872	1,886
TEHAMA	73	118	178	118	235							
TULARE	68,145	28,856	159,086	55,690	77,324	5,053	6,111	252	17,987	7,762	50,168	89,854
TUOLUMNE			83	156						42		
VENTURA	18,966	16,676	129,658	110,349	96,451	45,181	90,802	80,605	29,463	17,679	31,043	15,906
YOLO	194,749	328,146	1,036,242	433,447	69,949	5,923	4,200	3,983	386	1,215	60,064	26,078
YUBA	92	161	106	6		2,289	1,168	1,141	1,154	628	885	1,043

Table 9. Methyl Bromide Use by County for Years 1996-1999

COUNTY	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
ALAMEDA	9,883	4,662	5,709	6,877	14,663	18,374	13,300	7,444	16,620	7,818	9,892	5,022
AMADOR	46	65	78	187	201		90		666	198	53	100
BUTTE	3,066	604	3,240	5,844	26,211	48,315	53	32,065	103,503	383,035	80,154	7,135
CALAVERAS			119	341	50	80	220	399	887	351		399
COLUSA	285	160	126	852	2,684	924	512	1,713	1,163	6,775	1,676	242
CONTRA COSTA	1,900	1,925	2,276	2,452	2,552	2,442	4,020	5,786	4,148	6,645	5,861	2,946
DEL NORTE				149			32,107	186,361	3,901		150	
EL DORADO	376	490	1,152	722	379	357	50	7,610	639	1,112	234	462
FRESNO	278,379	256,700	302,109	163,905	66,621	60,146	241,664	135,060	462,110	464,541	694,773	456,858
GLENN			43,571	45,653						15,666	7,896	3,555
HUMBOLDT			60			1,635	147	914	10,614	30	133	
IMPERIAL	489,918	80,509	4,312				21,560	23,359	14,877	117		240,264
INYO						109		110	48			
KERN	400,743	343,518	324,028	141,943	97,114	131,325	378,789	713,818	803,544	373,893	755,459	514,491
KINGS	31,761	16,827	52,608	26,108	5,122	10,104	12,119	10,857	20,417	88,096	188,268	29,943
LAKE			64	2		180	358	30,259	7,312	25,118	406	137
LASSEN		27,584	91,312	3,703				159,290	59,028	1,159		
LOS ANGELES	142,961	147,583	154,466	157,938	146,029	129,466	134,493	172,874	139,296	122,315	119,322	130,189
MADERA	25,137	16,310	53,789	55,070	42,749	354	10,367	27,804	63,474	16,501	20,438	73,015
MARIN	1,282	1,393	1,292	1,559	1,751	2,272	3,416	2,141	1,806	2,525	1,051	1,894
MARIPOSA					3	9	63			44		
MENDOCINO	649	264	771	392	4,583	1,212	4,795	35,919	50,201	67,550	32,884	1,000
MERCED	497,829	664,968	747,617	544,539	170,168	24,774	83,969	106,883	195,614	189,083	326,371	808,022
MODOC				2,283				30,977	12,874			
MONO							76					
MONTEREY	63,321	53,261	183,944	119,009	180,586	377,216	626,175	1,434,119	2,550,621	2,697,820	899,159	28,950
NAPA	262	159	501	3,605	10,330	4,841	13,745	11,855	107,637	325,595	131,750	1,475
NEVADA	260	105	166	144		132	340	62	300	78	108	51
ORANGE	40,419	61,832	56,640	69,523	88,181	61,261	179,468	781,776	387,430	35,573	30,549	59,613
PLACER	607	649	606	838	15,310	8,971	806	6,365	9,055	2,161	4,691	2,170
RIVERSIDE	914,889	425,697	92,061	32,841	70,109	86,311	60,478	184,241	168,114	128,371	431,571	724,454

COUNTY	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
SACRAMENTO	20,382	2,666	4,572	20,069	36,284	14,276	13,884	11,591	4,359	5,540	24,787	3,740
SAN BENITO	2,114	642	36,550	4,199	5,995	29,095	9,634	22,041	54,485	98,580	42,168	440
SAN BERNARDINO	2,873	16,419	3,350	4,552	5,853	3,093	5,499	5,323	42,586	21,846	3,983	3,761
SAN DIEGO	44,024	131,965	175,998	281,942	155,315	159,410	193,965	120,608	129,919	65,114	41,230	60,707
SAN FRANCISCO	168	303	188	382	376	232	448	528	248	187	636	258
SAN JOAQUIN	148,364	62,802	389,172	454,628	126,846	120,278	74,994	159,370	259,202	430,083	448,401	237,871
SAN LUIS OBISPO	22,987	46,517	68,799	26,027	34,881	35,874	36,695	26,525	197,377	184,480	33,111	22,436
SAN MATEO	4,845	4,755	3,431	3,774	17,998	14,792	8,290	8,306	16,205	11,912	4,870	1,768
SANTA BARBARA	9,102	37,099	67,124	76,961	157,071	60,256	32,592	116,267	1,202,802	1,397,695	112,941	34,496
SANTA CLARA	1,307	1,041	1,271	6,202	4,154	19,275	22,978	4,902	34,400	66,606	25,662	2,843
SANTA CRUZ	4,475	8,102	19,977	75,966	83,815	60,505	116,453	496,243	1,037,585	939,436	165,539	7,128
SHASTA			23,804	26,540	7,154	9,148	42,291	234,725	77,277	9,467		54
SIERRA									33	95		
SISKIYOU			131,117	71,872	28			227,095	58,412	3,686		
SOLONO	1,350	1,584	3,375	19,721	3,704	9,058	6,407	34,879	50,908	111,875	63,564	8,125
SONOMA	3,211	3,261	3,242	4,842	11,518	42,802	96,145	253,471	291,254	518,129	370,308	3,244
STANISLAUS	145,413	145,739	243,735	157,304	65,204	33,290	47,579	153,682	585,153	386,276	415,980	203,933
SUTTER	22,452	2,912	18,963	8,272	19,743	3,749	26,223	210,257	166,121	454,603	293,135	35,548
TEHAMA	2,748	5,739	14,050	42,203	7,258	2,388	1,122	40,438	97,726	88,951	28,030	18,108
TULARE	90,060	305,267	415,665	152,076	30,205	46,791	197,486	165,872	285,543	698,621	504,634	146,078
TUOLUMNE	51		78			123	54	45	50	176		
VENTURA	24,304	54,565	150,943	289,124	385,818	705,922	859,064	2,063,363	1,528,495	125,850	83,477	50,644
YOLO	5,925	5,349	12,029	19,548	35,287	4,493	7,736	48,681	44,430	33,168	19,095	4,804
YUBA	2,698	213	2,434	11,888	618	742	1,227	12,609	16,324	231,995	195,559	11,346

Table 10. Annual Cropland Use of 1,3- Dichloropropene by Commodity (Pounds of Active Ingredient)

Crop	1996	1997	1998	1999	Total
CARROTS, GENERAL	730,564	929,297	923,379	863,111	3,446,351
SWEET POTATO	73,194	75,080	279,827	191,558	619,659
SOIL APPLICATION, PREPLANT-OUTDOOR (SEEDBED)	296,937	144,061	273,525	310,194	1,024,717
POTATO (WHITE, IRISH, RED, RUSSET)	93,724	264,134	169,057	164,386	691,301
GRAPES, WINE	24,036	99,350	150,468	222,418	496,272
CANTALOUPE	35,918	15,759	129,331	73,993	255,001
ALMOND	108,408	56,052	109,414	169,054	442,928
BRUSSELS SPROUTS	70,784	72,516	94,870	32,249	270,419
TOMATOES, FOR PROCESSING/CANNING	14,175	42,176	88,090	208,364	352,805
WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	15,257	26,291	62,276	78,702	182,526
OUTDOOR GROWN CUT FLOWERS OR GREENS	199	414	61,125	6,035	67,773
BROCCOLI	24,646	56,417	60,923	139,206	281,192
Total	1,489,838	1,783,544	2,404,283	2,461,269	8,130,944

Table 11. Annual Cropland Use of Chloropicrin by Commodity (Pounds of Active Ingredient)

Crop	1996	1997	1998	1999	Total
STRAWBERRY	1,987,330	1,887,525	1,913,493	2,402,937	8,191,285
SOIL APPLICATION, PREPLANT-OUTDOOR (SEEDBED)	197,831	238,694	282,417	277,113	996,055
OUTDOOR GROWN TRANSPLANT	156,286	132,660	179,225	111,408	579,579
TOMATO	79,458	73,609	93,094	136,771	382,932
LETTUCE, HEAD	74,804	82,820	92,755	78,758	329,137
OUTDOOR GROWN CUT FLOWERS OR GREENS	49,097	69,143	69,197	92,797	280,234
OUTDOOR CONTAINER/FIELD GROWN PLANTS	64,323	49,531	67,626	90,557	272,037
UNCULTIVATED AGRICULTURAL AREAS	19,401	20,938	60,296	20,730	121,365
PEPPERS (FRUITING VEGETABLE), (BELL, CHILI, ETC.)	36,928	4,710	38,559	48,981	129,178
LETTUCE, LEAF)	25,965	16,690	26,920	14,756	84,331
CARROTS, GENERAL	3,344	8,422	25,424	43,158	80,348
CELERY, GENERAL	20,223	20,964	24,489	16,322	81,998
Total	2,716,986	2,607,703	2,875,493	3,336,287	11,528,479

Table 12. Annual Cropland Use of Metam Sodium by Commodity (Pounds of Active Ingredient)

Crop	1996	1997	1998	1999	Total
CARROTS, GENERAL	4,602,729	5,823,590	5,779,224	6,430,926	22,636,469
TOMATOES, FOR PROCESSING/CANNING	3,655,522	2,673,036	2,640,872	3,496,926	12,466,356
POTATO (WHITE, IRISH, RED, RUSSET)	1,438,776	1,260,222	1,205,154	181,280	4,085,432
COTTON, GENERAL	1,719,734	1,331,770	414,502	656,188	4,122,194
CANTALOUPE	220,529	391,616	335,611	390,573	1,338,329
LETTUCE, LEAF	228,925	269,145	303,975	130,285	932,330
ONION (DRY, SPANISH, WHITE, YELLOW, RED,	124,647	182,958	280,294	318,855	906,754
SOIL APPLICATION, PREPLANT-OUTDOOR (SEEDBED)	235,749	166,472	223,210	343,179	968,610
PEPPERS (FRUITING VEGETABLE), (BELL, CHILI, ETC.)	243,630	238,859	216,619	329,140	1,028,248
SWEET POTATO	313,942	245,066	205,573	362,396	1,126,977
SPINACH	40,435	83,593	173,286	87,820	385,134
LETTUCE, HEAD	548,924	81,316	147,418	34,909	812,567
Total	13,375,538	12,749,640	11,927,736	12,764,476	50,809,400

Table 13. Annual Cropland Use of Methyl Bromide by Commodity (Pounds of Active Ingredient)

Crop	1996	1997	1998	1999	Total
STRAWBERRY	4,374,955	4,041,796	4,251,831	5,178,295	17,846,877
SOIL APPLICATION, PREPLANT-OUTDOOR (SEEDBED)	1,403,438	2,148,825	1,522,671	1,840,036	6,914,970
OUTDOOR CONTAINER/FIELD GROWN PLANTS	1,122,379	922,653	1,064,688	971,280	4,081,000
OUTDOOR GROWN TRANSPLANT	515,562	509,527	547,145	447,077	2,019,311
SWEET POTATO	611,586	766,042	541,923	403,442	2,322,993
ALMOND	613,743	881,792	502,949	267,471	2,265,955
GRAPES, WINE	1,480,701	897,380	478,272	681,834	3,538,187
OUTDOOR GROWN CUT FLOWERS OR GREENS	426,511	545,718	444,971	336,322	1,753,522
PEPPERS (FRUITING VEGETABLE), (BELL, CHILI, ETC.)	344,828	295,151	403,080	498,480	1,541,539
TOMATO	336,194	263,210	304,411	352,727	1,256,542
PEACH	248,082	287,120	280,028	254,673	1,069,903
GRAPES	299,627	569,054	273,836	251,243	1,393,760
Total	11,779,602	12,130,265	10,617,803	11,484,879	46,004,559

Table 14. Monthly Use of 1,3-Dichloropropene, Chloropicrin, Metam Sodium, and Methyl Bromide for 1996-1999 (Pounds of Active Ingredient)

Month	1,3-Dichloropropene	Chloropicrin	Metam sodium	Methyl bromide	Total
JANUARY	474,684	1,245,860	5,419,699	3,223,843	10,364,086
FEBRUARY	626,528	1,268,822	4,069,875	2,676,149	8,641,374
MARCH	1,040,229	2,552,276	8,976,219	4,021,847	16,590,571
APRIL	752,523	2,083,793	5,986,862	3,375,876	12,199,054
MAY	703,671	1,220,610	2,622,504	2,270,923	6,817,708
JUNE	470,029	1,847,256	2,823,720	2,615,827	7,756,832
JULY	926,301	3,227,341	6,472,440	4,211,424	14,837,506
AUGUST	693,268	8,176,708	7,362,082	10,196,781	26,428,839
SEPTEMBER	748,547	10,181,470	6,222,453	13,513,466	30,665,936
OCTOBER	1,543,406	8,297,229	4,632,445	12,340,886	26,813,966
NOVEMBER	2,236,167	2,925,324	3,196,179	6,048,516	14,406,186
DECEMBER	712,671	1,211,593	3,002,645	3,099,199	8,026,108
Total	10,928,024	44,238,282	60,787,123	67,594,737	183,548,166

C. RECOMMENDATIONS

Ambient Air Monitoring

The historical trends in 1,3-dichloropropene and metam sodium use suggest that monitoring should occur over a two month period during July and August in Kern County. Monitoring in Kern County should focus on the use of 1,3-dichloropropene and metam sodium, but since there is significant use of all four chemicals, monitoring should be simultaneous for all four. Figures 5(a-d) display 1,3-dichloropropene, chloropicrin, metam sodium, and methyl bromide use in Kern County during the period from July 1 through September 15 for 1997, 1998, and 1999. Attachments E through H display 1,3-dichloropropene, chloropicrin, metam sodium, and methyl bromide use by section in the Central Valley during 1998 and 1999.

In Monterey and Santa Cruz Counties, historical trends indicate that monitoring for methyl bromide and chloropicrin should take place during September and October. Monitoring in Monterey or Santa Cruz County should focus on methyl bromide and chloropicrin, but since there is significant use of all four chemicals, monitoring should be done simultaneously. Figures 6(a-d) and Figures 7(a-d) display 1,3-dichloropropene, chloropicrin, metam sodium, and methyl bromide use in Monterey and Santa Cruz Counties during the period from September 1 through November 15 for 1997, 1998, and 1999; respectively. Attachments A through D display 1,3-dichlorpropene, chloropicrin, metam sodium, and methyl bromide use by section in the Central Coast during 1998 and 1999.

Five sampling sites (5 sites and one urban background site) should be selected in relatively high-population areas or in areas frequented by people (e.g., schools or school district offices, fire stations, or other public buildings). Samples should be collected and analyzed for 1,3-dichloropropene, chloropicrin, methyl bromide, and metam sodium (as the breakdown products methyl isothiocyanate and methyl isocyanate). Monitoring for all four chemicals should be performed simultaneously. At each site, 4 samples per week should be collected randomly over the full seven-day week during the sampling period. Background samples should be collected in an area distant to applications of 1,3-dichloropropene, chloropicrin, metam sodium, and methyl bromide. Target 24-hour quantitation limits of at least 0.01 $\mu g/m^3$ for 1,3-dichloropropene, 0.1 $\mu g/m^3$ for chloropicrin, 0.5 $\mu g/m^3$ for methyl isothiocyanate, 0.05 $\mu g/m^3$ for methyl isocyanate, and 0.4 $\mu g/m^3$ for methyl bromide are recommended.

DPR recommends close coordination with the county agricultural commissioner to select the best sampling sites and periods. In addition to the primary samples, replicate (co-located) samples are needed for 4 dates at each sampling location. Field spike samples should be collected at the same environmental conditions (e.g., temperature, humidity, exposure to sunlight) and experimental conditions (e.g., air flow rates) as those occurring at the time of ambient sampling. Additionally, we request that you provide in the ambient monitoring report: 1) the proximity of the sampler to treated or potentially treated fields, including the distance and direction, and 2) the distance the sampler is located above the ground.

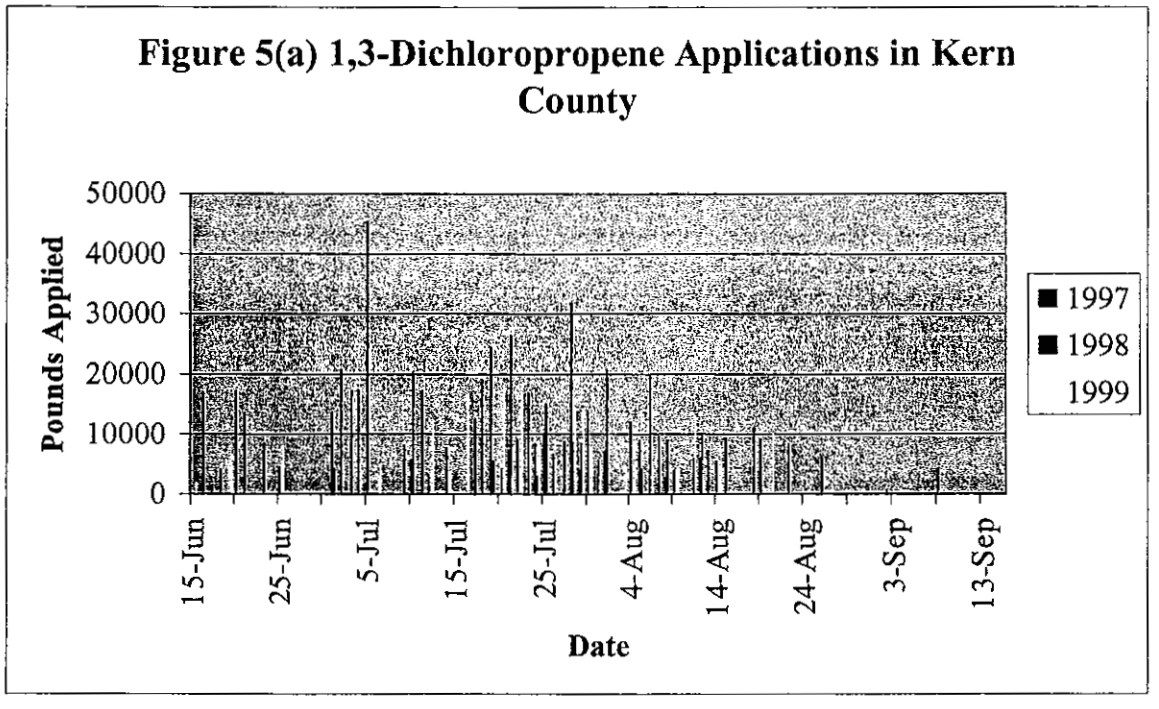


Figure 5(b) Chloropicrin Applications in Kern County

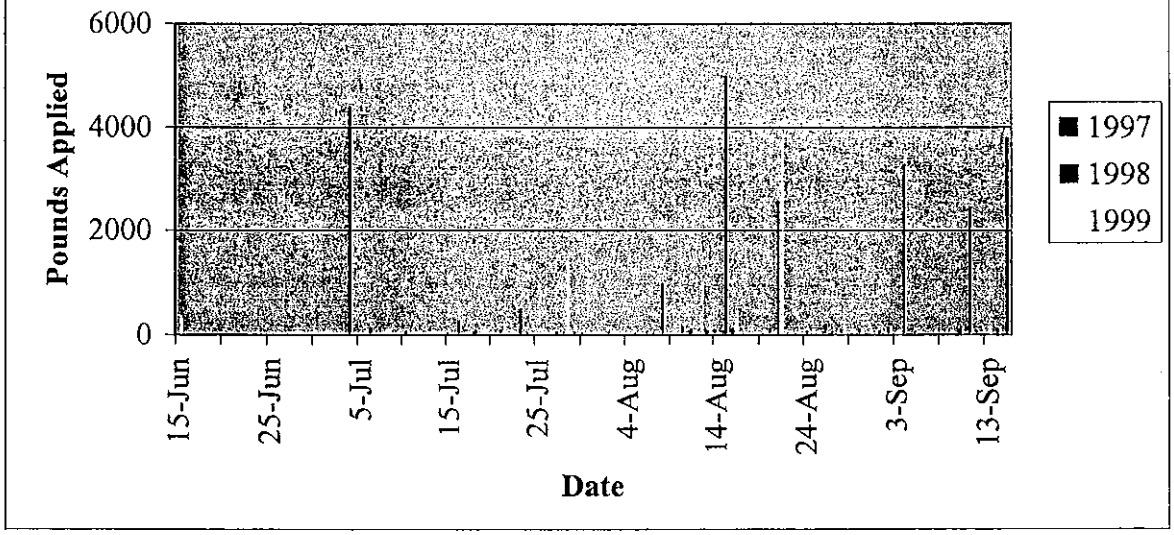


Figure 5(c) Metam-sodium Applications in Kern County

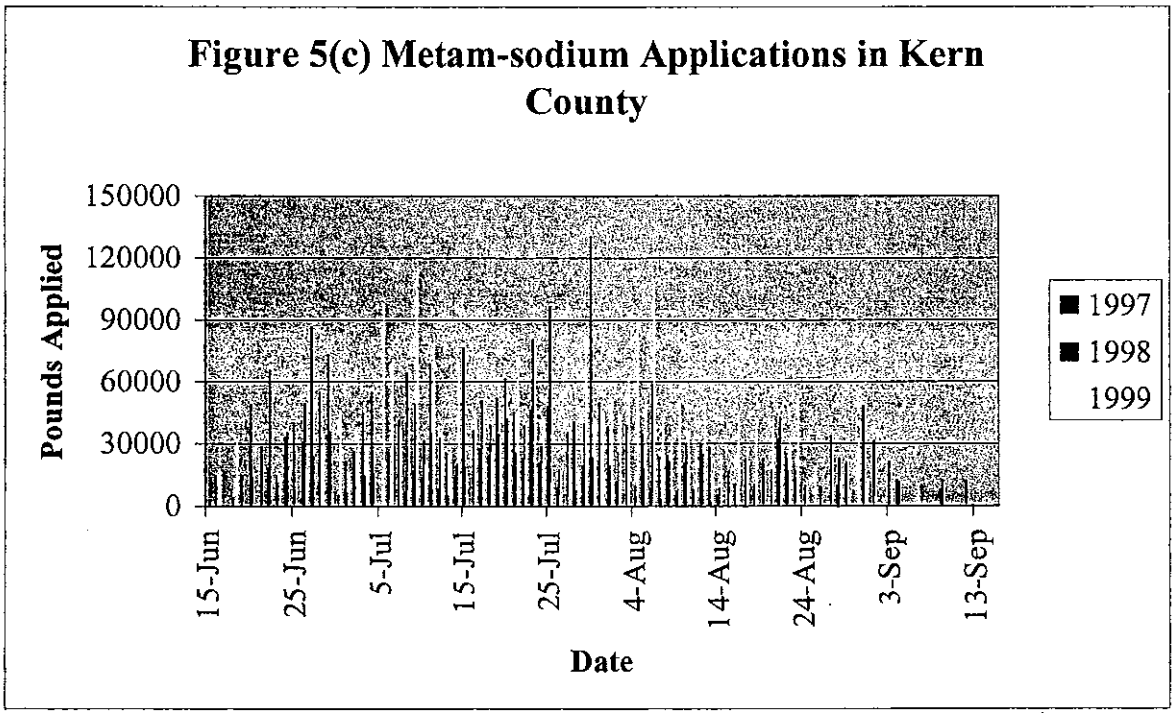


Figure 5(d)Methyl Bromide Applications in Kern County

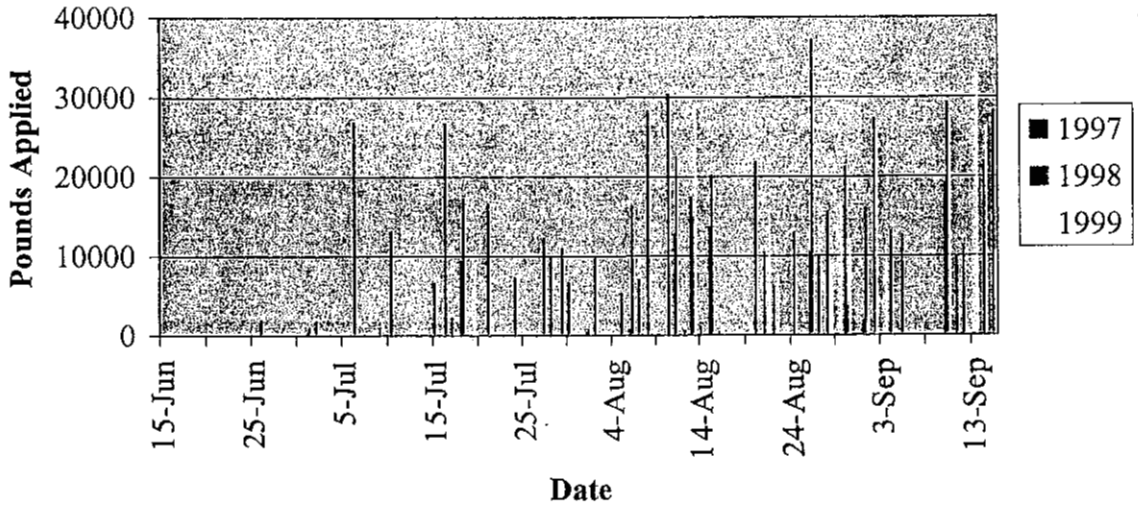
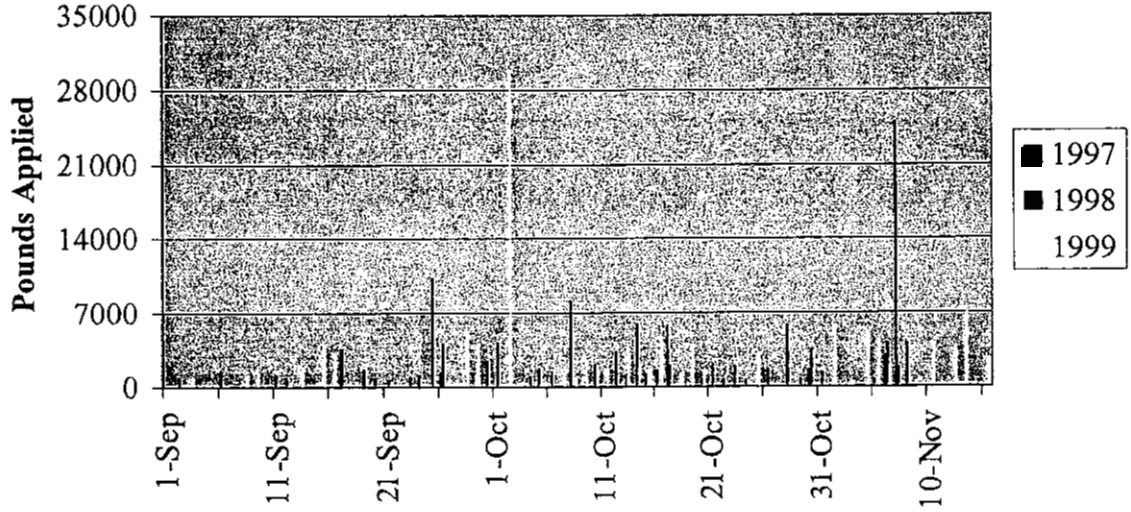


Figure 6(a) 1,3-Dichloropropene Use in Monterey County



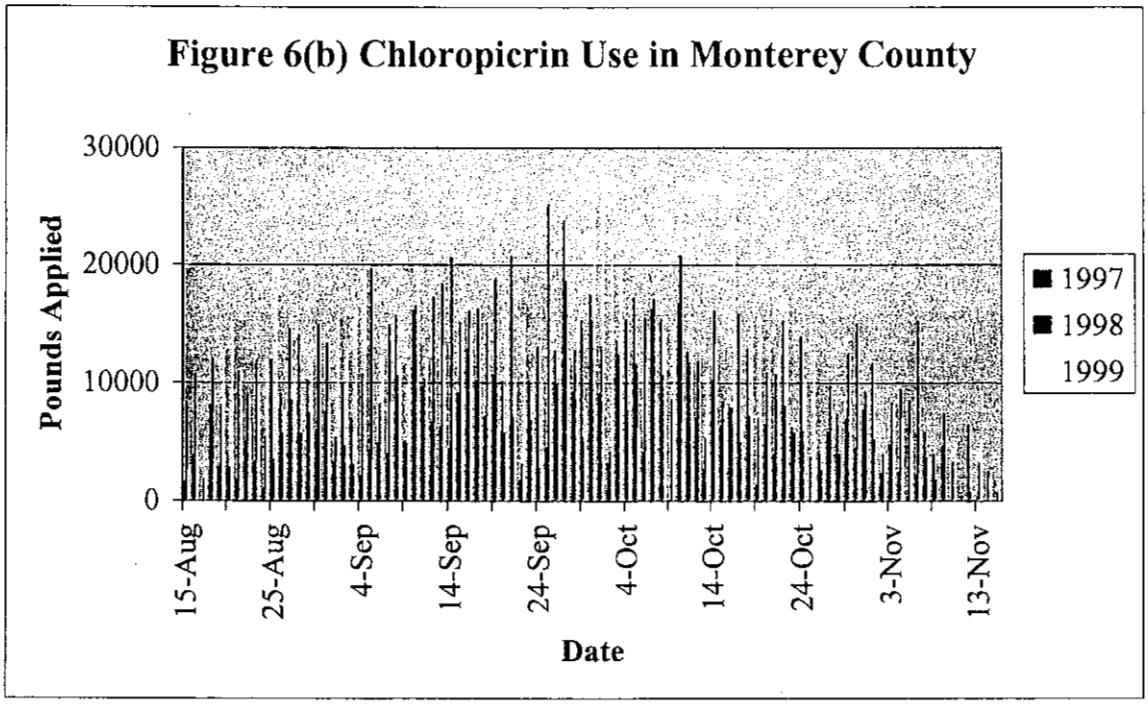


Figure 6(b) Chloropicrin Use in Monterey County
Pounds Applied
30000
20000
10000
0
15-Aug
25-Aug
4-Sep
14-Sep
24-Sep
4-Oct
14-Oct
24-Oct
3-Nov
13-Nov
Date
1997
1998
1999

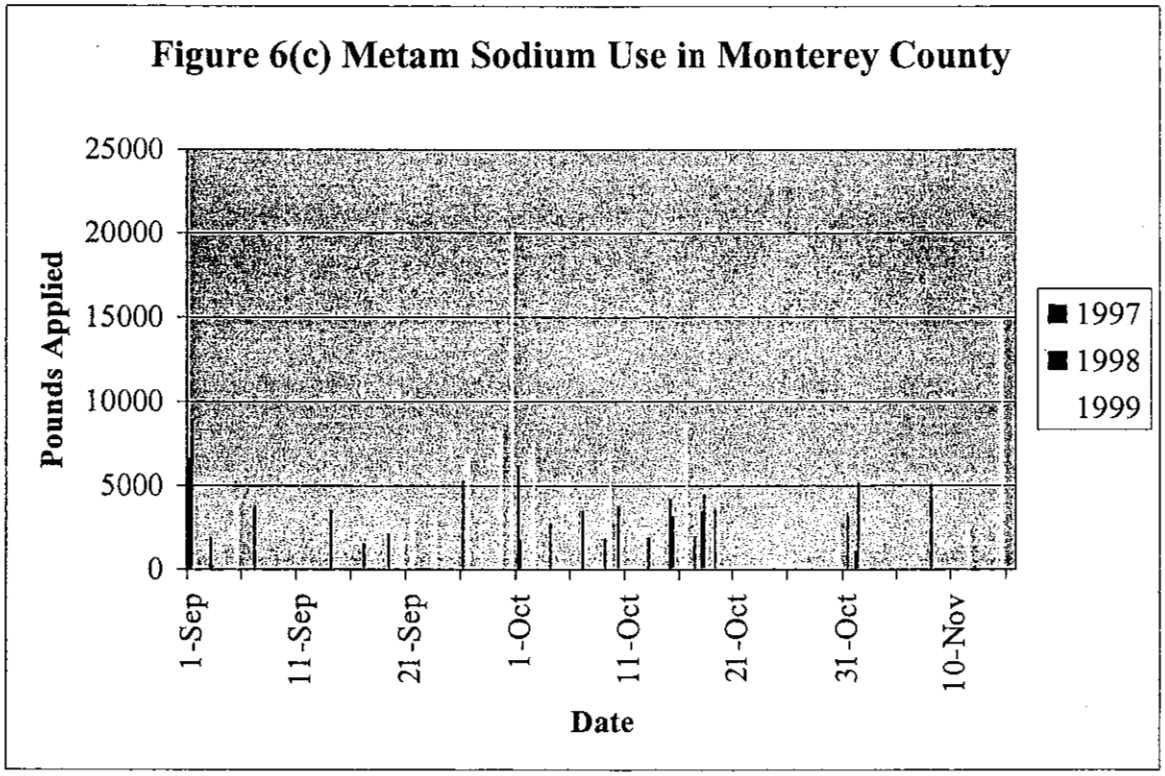


Figure 6(c) Metam Sodium Use in Monterey County
Pounds Applied
25000
20000
15000
10000
5000
0
1-Sep
11-Sep
21-Sep
1-Oct
11-Oct
21-Oct
31-Oct
10-Nov
Date
1997
1998
1999

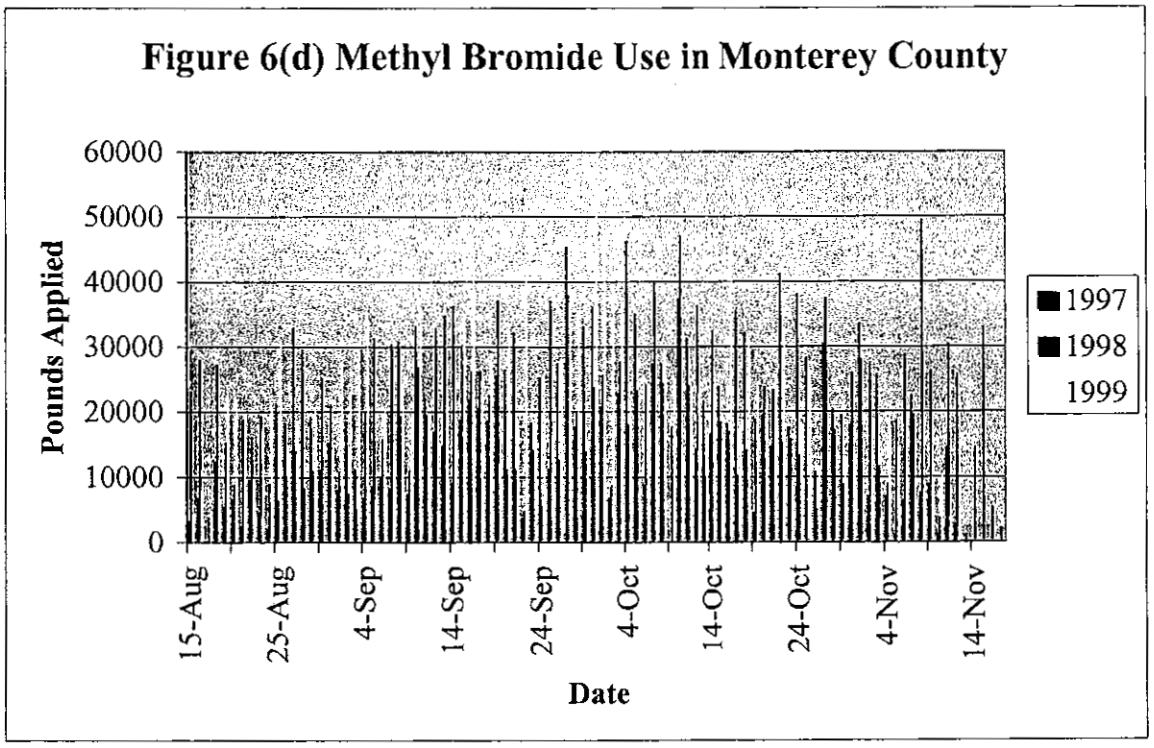


Figure 6(d) Methyl Bromide Use in Monterey County
Pounds Applied
60000
50000
40000
30000
20000
10000
0
15-Aug
25-Aug
4-Sep
14-Sep
24-Sep
4-Oct
14-Oct
24-Oct
4-Nov
14-Nov
Date
1997
1998
1999

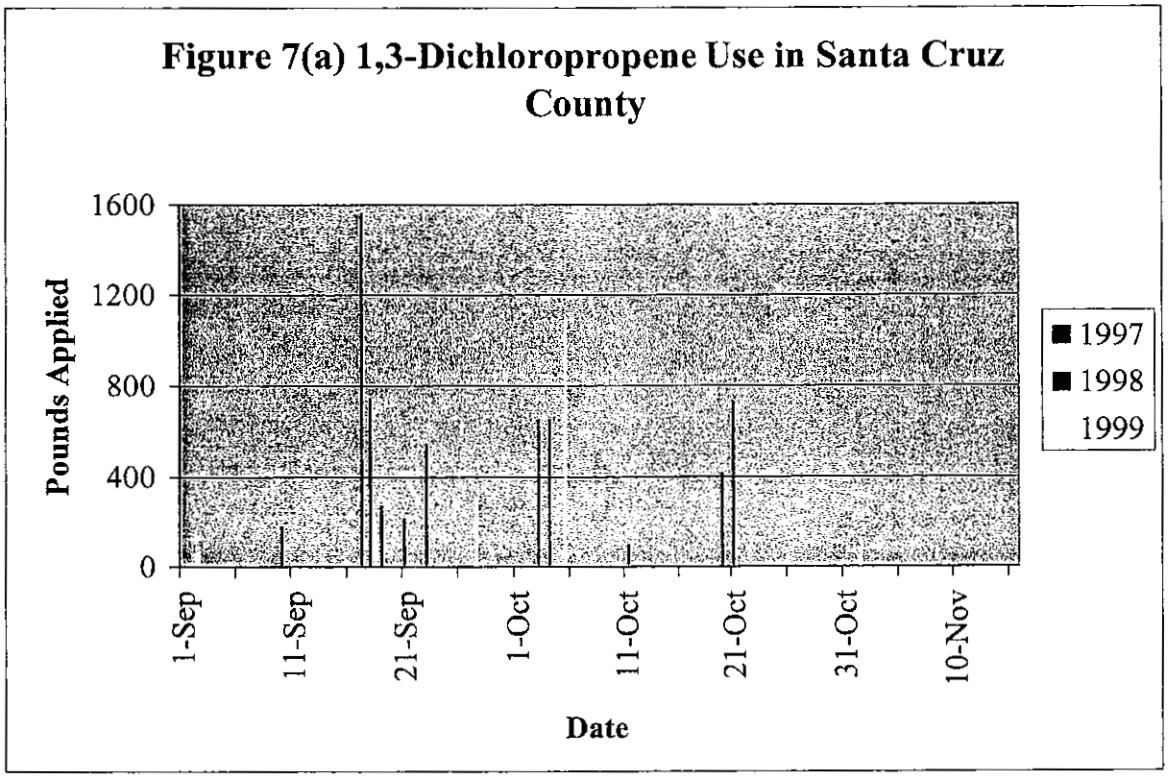


Figure 7(a) 1,3-Dichloropropene Use in Santa Cruz County
Pounds Applied
1600
1200
800
400
0
1-Sep
11-Sep
21-Sep
1-Oct
11-Oct
21-Oct
31-Oct
10-Nov
Date
1997
1998
1999

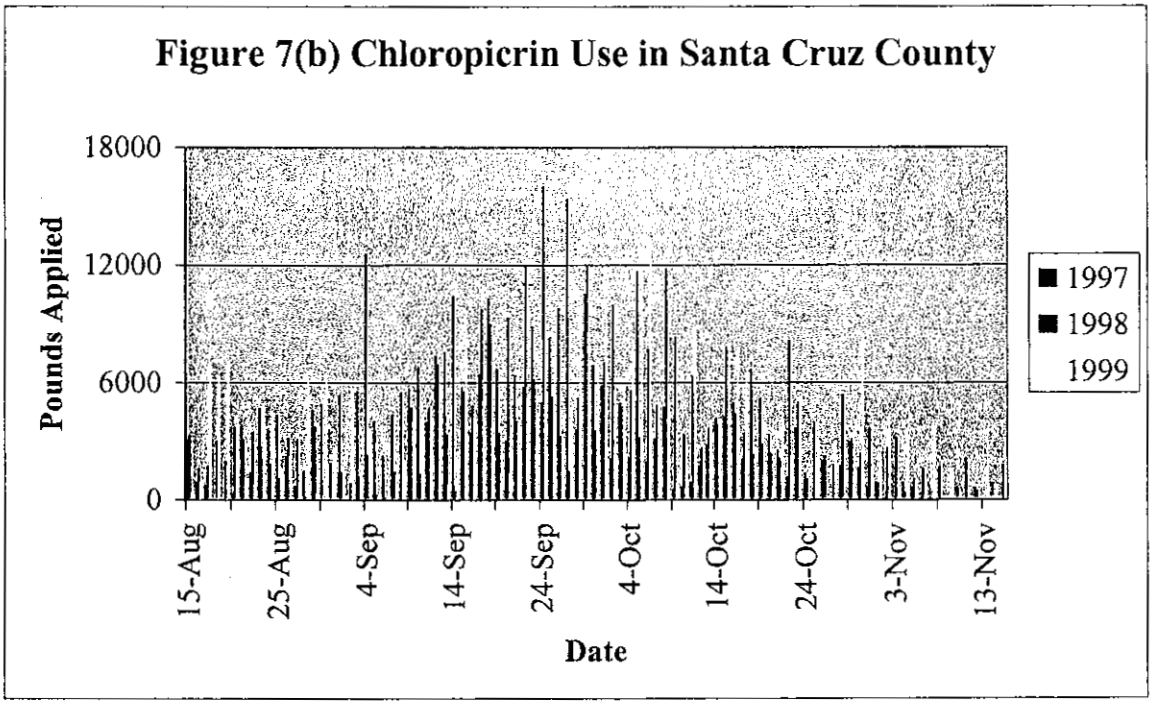


Figure 7(b) Chloropicrin Use in Santa Cruz County
Pounds Applied
18000
12000
6000
0
15-Aug
25-Aug
4-Sep
14-Sep
24-Sep
4-Oct
14-Oct
24-Oct
3-Nov
13-Nov
Date
1997
1998
1999

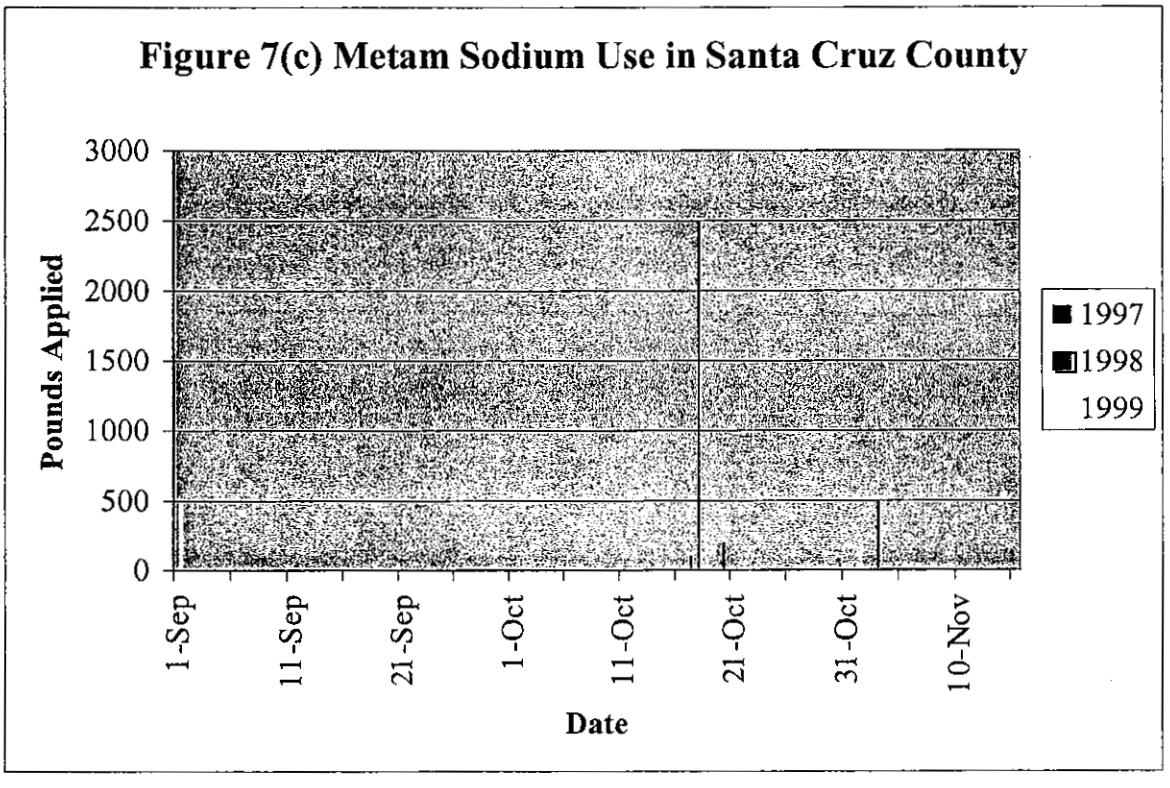
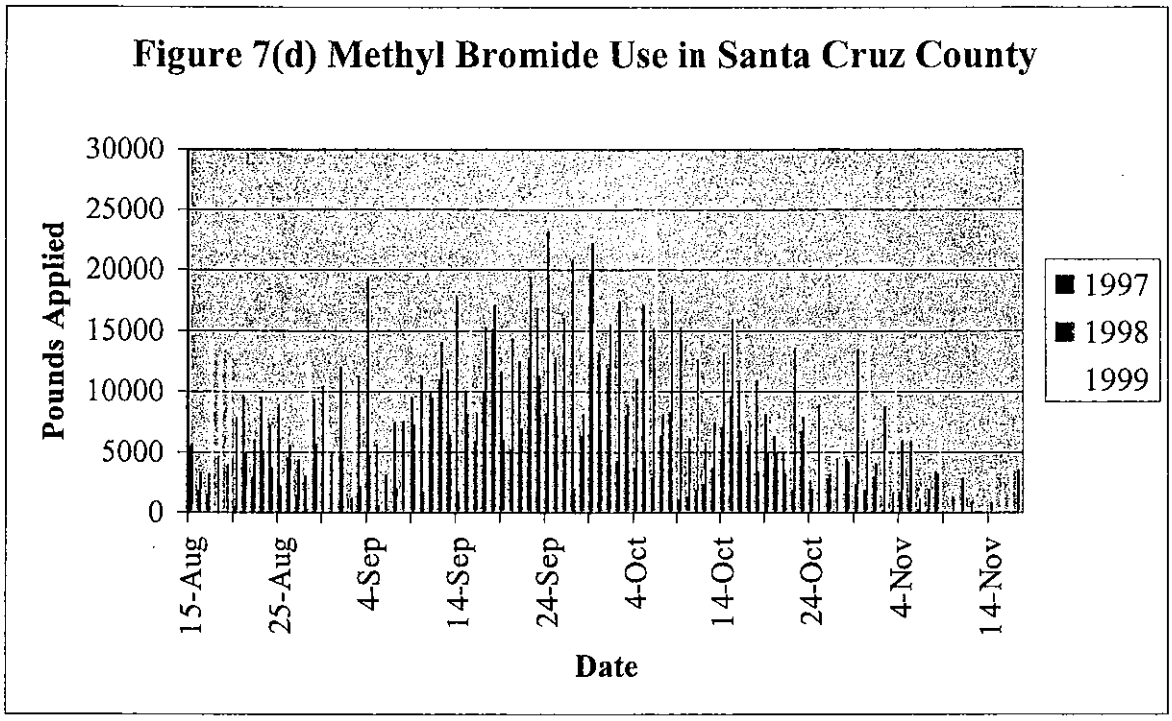


Figure 7(c) Metam Sodium Use in Santa Cruz County
Pounds Applied
3000
2500
2000
1500
1000
500
0
1-Sep
11-Sep
21-Sep
1-Oct
11-Oct
21-Oct
31-Oct
10-Nov
Date
1997
1998
1999



Application-Site Air Monitoring

Application monitoring should be done for the chemicals chloropicrin and metam sodium (as the breakdown products methyl isothiocyanate, methyl isocyanate, hydrogen sulfide, and carbon disulfide). No application monitoring is requested at this time for 1,3-dichloropropene or methyl bromide unless an application of methyl bromide and chloropicrin can be monitored simultaneously. DPR would prefer a bed fumigation of chloropicrin in which methyl bromide is also used so that they can be monitored simultaneously. Ideally, monitoring should occur at a site using the highest allowed rates of use (i.e., between 150 to 400 pounds per acre overall). DPR requests monitoring for metam sodium be a drip irrigation application at a site using the highest allowed rates of use (i.e. about 318 pounds AI per acre). Most applications of chloropicrin and metam sodium using these methods occur in the central coast area.

DPR recommends close coordination with the county agricultural commissioner to select the best sampling sites and date. Ideally, the monitoring study should include samples taken before, during, and post application for 72 hours. To minimize exposure to sampling personnel, we recommend the following revised sampling schedule:

Sample period begins:	Sample duration time
Background (pre-application)	Minimum 12 hours
During application and post-application	Start of application until 1 hour before sunset
1 hour before sunset	Overnight[1] (until 1 hour after sunrise)
1 hour after sunrise	Daytime (until 1 hour before sunset)
1 hour before sunset	Overnight (until 1 hour after sunrise)
1 hour after sunrise	Daytime (until 1 hour before sunset)
1 hour before sunset	Overnight (until 1 hour after sunrise)

[1] All overnight samples must include the period from one hour before sunset to one hour after sunrise.

In the event that application occurs at night, the alternate day-night schedule should be followed. Frequently, fumigation may take two or more days. In these instances, follow the above schedule from the last day of application, since this will give the most representative air concentration trend following application.

The selected field should be 10 acres in area, or larger. A minimum of eight samplers should be positioned, one on each side of the field and one at each corner. A ninth replicate sampler should be co-located at one position. Ideally, samplers should be placed a minimum of 20 meters from the field. Field spike samples should be collected at the same environmental conditions (temperature humidity, exposure to sunlight) and experimental conditions (similar air flow rates) as those occurring at the time of sampling. Since the four chemicals are used in the area, background samples should collect enough volume to achieve the recommended target 24-hour quantitation limits (see ambient air monitoring section).

Additionally, we request that you provide in the monitoring report: 1) an accurate record of the positions of the monitoring equipment with respect to the field, including the exact distance that the sampler is positioned from the field, and if necessary how the field was divided to treat over several days; 2) an accurate drawing of the monitoring site showing the precise location of the meteorological equipment, trees, buildings, and other obstacles; 3) meteorological data collected at a minimum of 15-minute intervals including wind speed and direction, humidity, and air temperature, and comments regarding degree of cloud cover; 4) the elevation of each sampling station with respect to the field, and the orientation of the field with respect to North (identified as either true or magnetic North); and 5) the start and end time of the application.

Due to the high application rates and high volatility of these pesticides, the potential for exposure is higher than most other pesticides. However, this recommendation should not require any special safety equipment or precautions for sampling personnel.

D. SAFETY RECOMMENDATIONS

Most of the following safety precautions pertain to applicators. The sampling schedule is arranged so that sampling personnel do not need to be near the field during application, so these precautions are not necessary.

1,3-Dichloropropene

The 1,3-dichloropropene product labels warn that 1,3-dichloropropene may cause substantial, but temporary, eye injury if the product gets into the eyes. The product may cause skin irritation, skin burns, allergic skin reaction and be fatal if absorbed through the skin. The vapor may be fatal if inhaled and may cause lung, liver, and kidney damage and respiratory system irritation upon prolonged contact.

Monitoring personnel should use proper protective equipment to prevent exposure to the dust, vapors or spray mist. According to the product labels, proper protective equipment for applicators making direct contact or for applicators outside an enclosed cab includes coveralls, chemical-resistant gloves and footwear plus socks, face sealing goggles, chemical resistant headgear (for overhead exposure) and apron, and a respirator with an organic-vapor removing cartridge. Monitoring personnel should refer to the label of the actual product used for further precautions.

Chloropicrin

The chloropicrin product labels warn that chloropicrin is a poisonous liquid and vapor and is readily identifiable by smell. Inhalation of vapors may be fatal and exposures to low concentrations of vapor will cause irritation of the eyes, nose, and throat. Exposure to high concentrations or for a prolonged period of time may cause painful irritation to the eyes or temporary blindness. Contact with the liquid will cause chemical burns to the skin or eyes and is harmful or fatal if swallowed.

The acceptable air concentration for persons exposed to chloropicrin is 0.1 ppm. If air concentrations exceed 0.1 ppm, an air purifying respirator must be worn; if air concentrations exceed 4 ppm, an air supplying respirator must be worn. The highest concentrations of chloropicrin at 20 m from the field should not exceed 0.05 to 0.08 ppm. The label states that the applicator and other handlers must wear: loose fitting, log-sleeve shirt and long pants, shoes and socks, and full-face shield or safety glasses with brow and temple shields. Monitoring personnel should refer to the label of the product used and should use proper protective equipment to prevent exposure to the dust, vapors, or spray mist.

Metam sodium

The metam sodium product labels warn that metam sodium causes skin damage and may be fatal if absorbed through the skin. Prolonged or frequent contact may cause an allergic reaction. Metam sodium is harmful if inhaled or swallowed and is irritating to eyes, nose, and throat.

Monitoring personnel should use proper protective equipment to prevent exposure to the vapors or spray mist and refer to the label of the actual product used for further precautions. According to

the product labels, proper protective equipment for applicators making direct contact or for applicators outside an enclosed cab includes coveralls, waterproof gloves, chemical resistant footwear plus socks, face sealing goggles, chemical resistant headgear (for overhead exposure) and apron, and a respirator with an organic-vapor removing cartridge. Concentrations should not exceed 0.5 ppm for any of the sampling intervals at the 60 foot sampling distance from the field.

Methyl bromide

According to the product labels for methyl bromide, it is an extremely hazardous liquid and vapor under pressure. Inhalation may be fatal or cause serious acute illness or delayed lung or nervous system injury. Liquid or vapor may cause skin or eye injury. Methyl bromide vapor is odorless and non-irritating to skin and eyes during exposure and toxic levels may occur without warning or detection.

The acceptable air concentration for persons exposed to methyl bromide is 5 ppm, except for those in residential or commercial structures. A respirator is required if air concentrations exceed 5 ppm at any time. According to the label, proper protective equipment for applicators include loose fitting or well-ventilated long-sleeved shirt and long pants, shoes and socks, full-face shield or safety glasses with brow and temple shields. Monitoring personnel should refer to the label of the actual product used for further precautions. Methyl bromide concentrations at the buffer zone distance should not exceed 1 ppm at any time.

E. REFERENCES

Alvarez, R.A. and C. B. Moore. 1994. Quantum yield for the production of CH_3NC in the photolysis of CH_3NCS. Science 263:205-207.

Ashley, M.G., B.L. Leigh and L.S. Lloyd. 1963. The action of metam-sodium in soil. II. Factors affecting the removal of methyl isothiocyanate residues. Journal of the Science of Food and Agriculture 14:153-161.

Atkinson, R., D.L. Baulch, R.A. Cox, R.F. Hampsom, Jr., J.A. Kerr, M.J. Rossi, and J. Troe. 1997. Evaluated kinetic and photochemical data for atmospheric chemistry: *supplement* VI. Journal of Physical Chemistry Ref. Data, 26:1329-1499.

DPR. 1996-1999. Annual Pesticide Use Reports. California Department of Pesticide Regulation, Sacramento, California.

DPR. 2000. Pesticide Label Database. California Department of Pesticide Regulation, Sacramento, California.

EXTOXNET. 2000. Extension Toxicology Network, Pestcide Information Profiles. [Online] Available : http://ace.orst.edu/info/extoxnet/pips

Geddes, J.D., G.C. Miller and G.E. Taylor, Jr. 1995. Gas phase photolysis of methyl isothiocyanate. Environmental Science and Toxicology 29:2590-2594.

Hein, R., P.J. Crutzen, and M. Heinmann. 1997. An inverse modeling approach to investigate the global atmospheric methane cycle. Global Biogeochemical Cycles 11:43-76.

Howard, Philip P. 1991. Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Volume III, Pesticides. Lewis Publishers, New York, New York.

Kollman, W. and R. Segawa. 1995. Interim report of the pesticide chemistry database. Report No. EH 95-04. Department of Pesticide Regulation. Sacramento, California.

Leistra, M. and S.J.H. Crum. 1990. Emission of methyl isothiocyanate to the air after application of metham-sodium to greenhouse soil. Water, Air, and Soil Pollution 50:109-121.

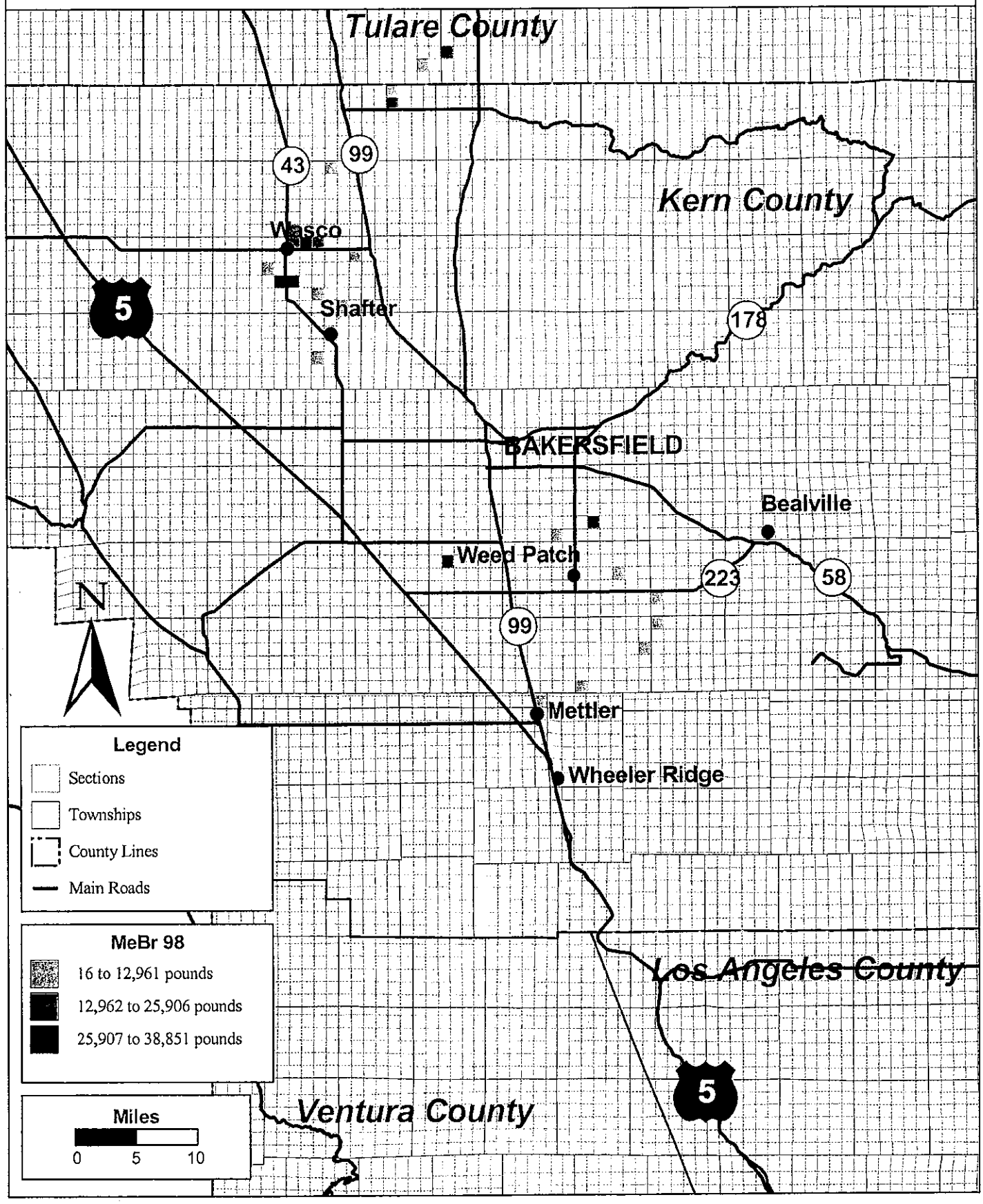
Mongomery, John H. 1997. Agrochemicals Desk Reference. 2nd Edition. Lewis Publishers, New York, New York.

The Agrochemicals Handbook, 3rd edition. 1991. Royal Society of Chemistry , Information Services.

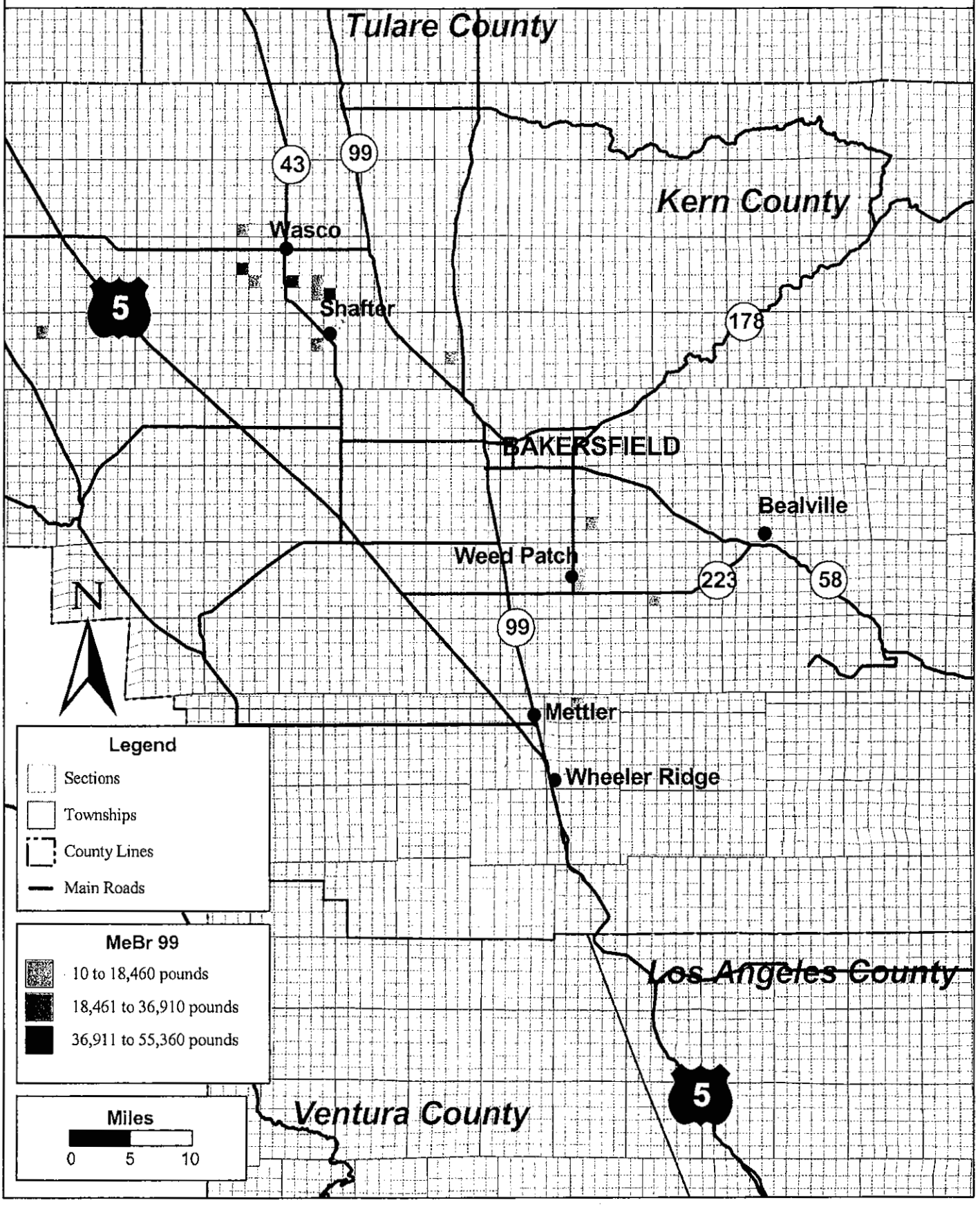
Tomlin, C. (ed) 1997. The Pesticide Manual: Eleventh Edition. Crop Protection Publications, British Crop Protection Council and the Royal Society of Chemistry. United Kingdom.

Tuazon, E.C., R. Atkinson, A.M. Winer, and J.N. Pitts, Jr. 1984. "A Study of the Atmospheric Reactions of 1,3-Dichloropropene and Other Selected Organochlorine Compounds."Arch. Environ. Contam. Toxicol., 13(6):691-700.

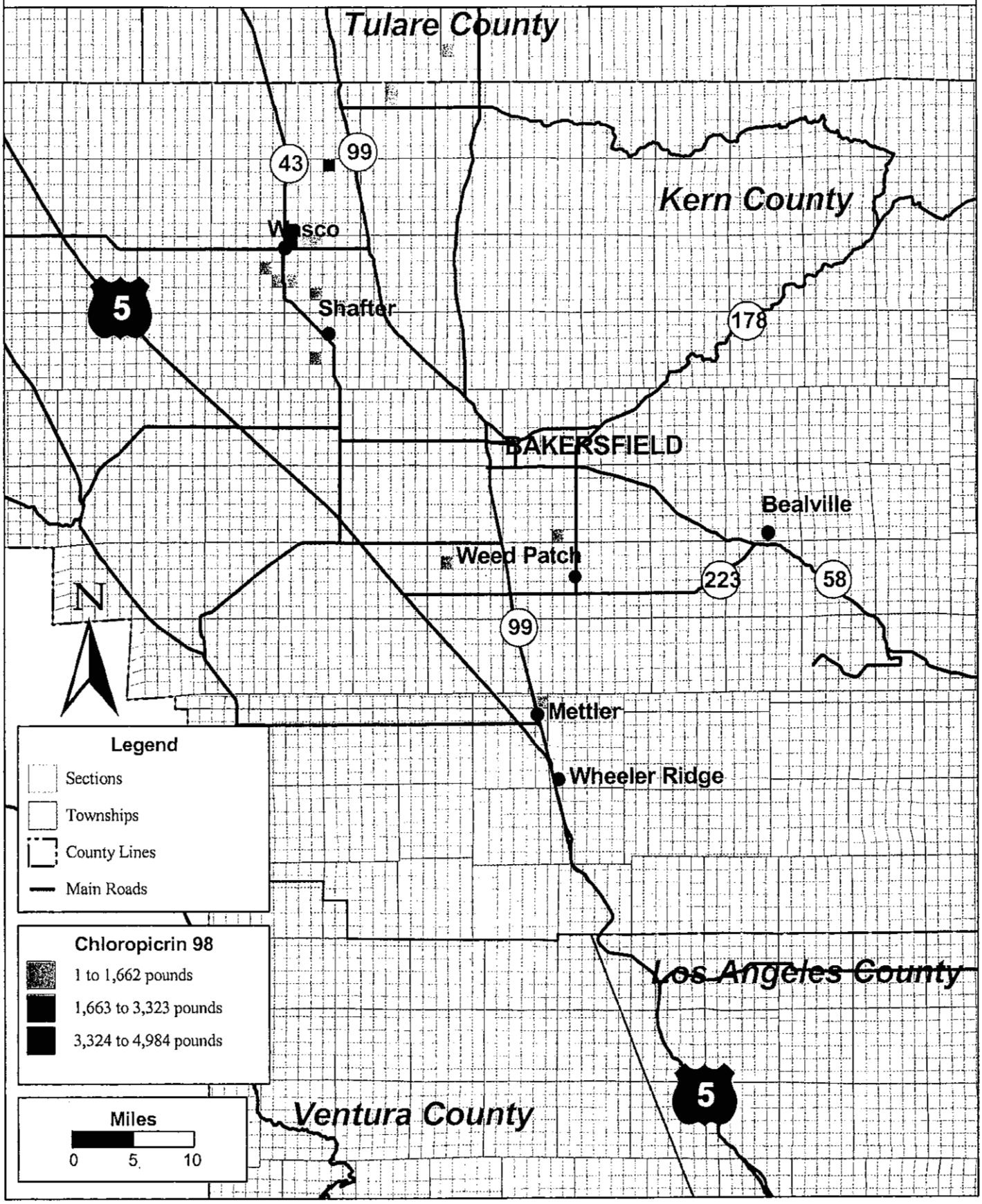
Attachment H (1): 1998 Methyl Bromide Use in the Central Valley Region (July 1-September 15, 1998)



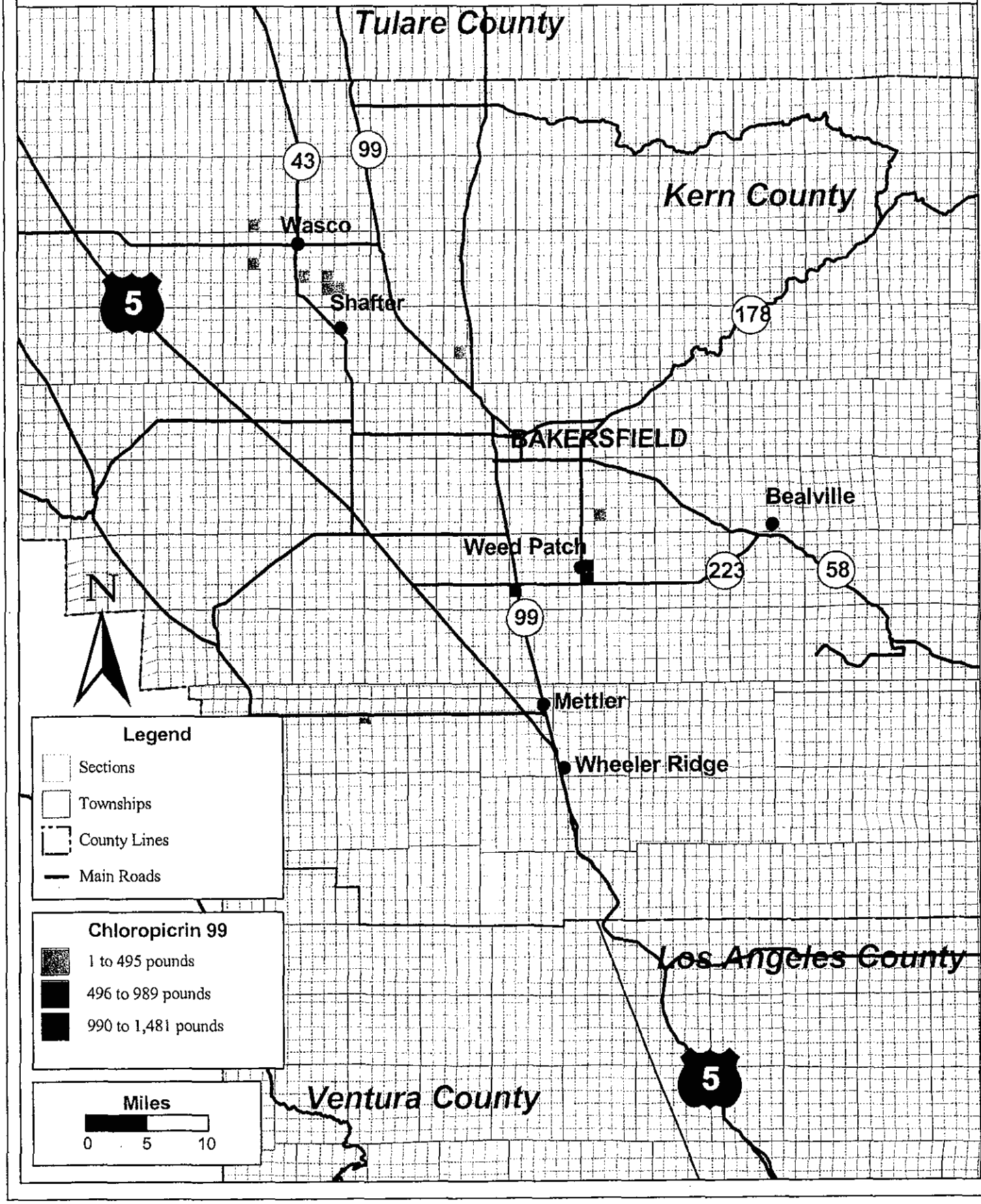
Attachment H (2): 1999 Methyl Bromide Use in the Central Valley Region
(July 1-September 15, 1999)



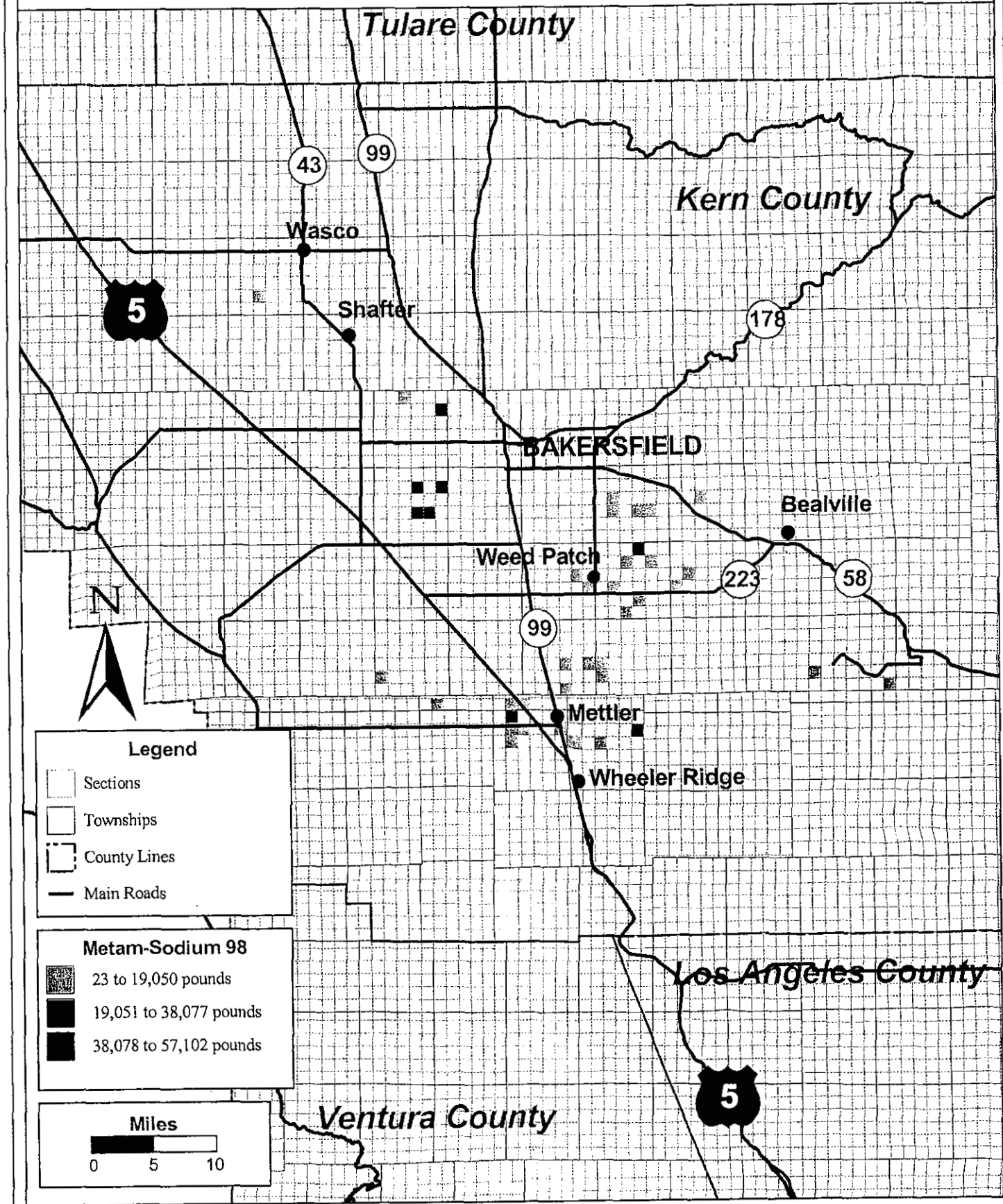
Attachment F (1): 1998 Chloropicrin Use in the Central Valley Region (July 1-September 15, 1998)



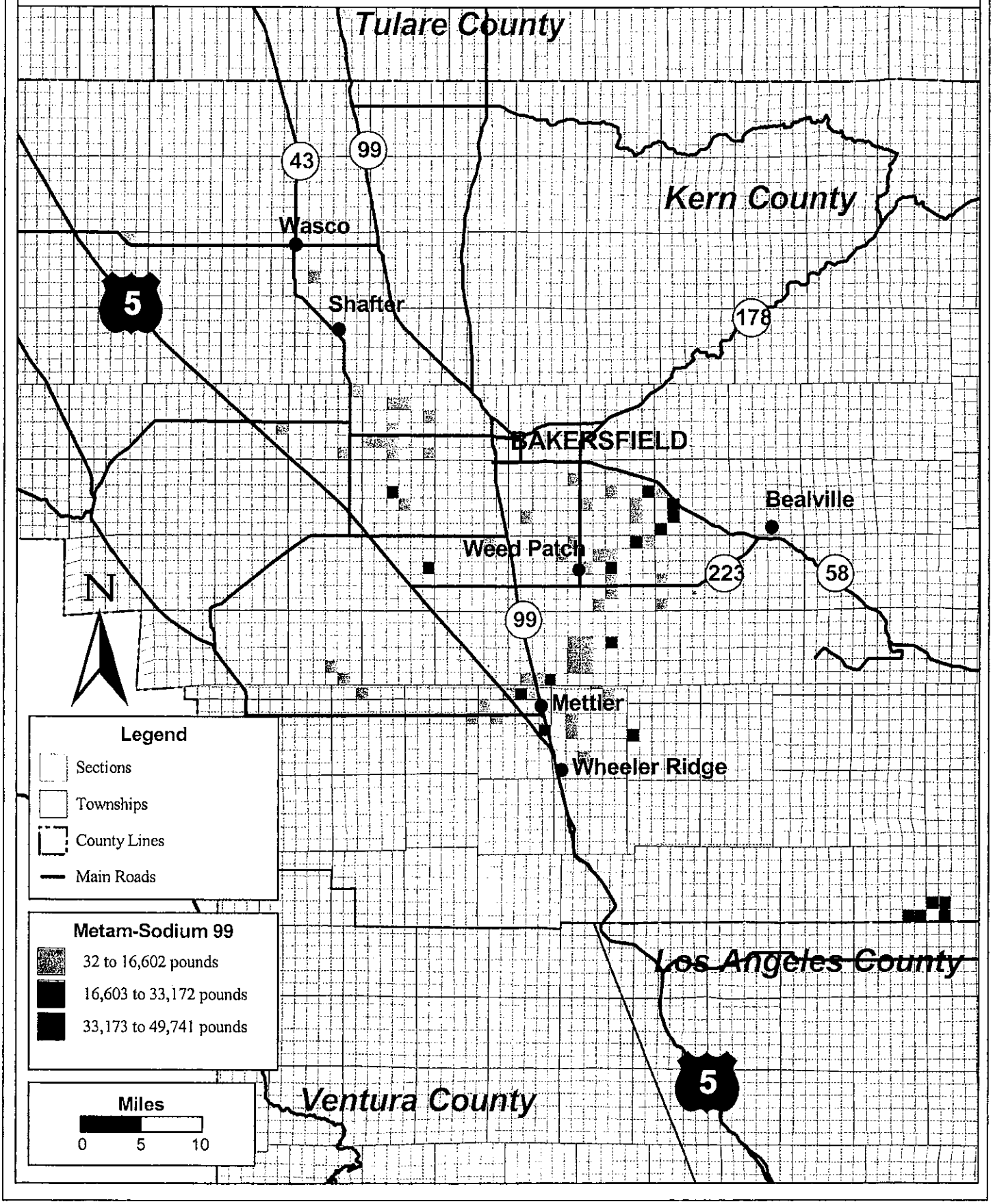
Attachment F (2): 1999 Chloropicrin Use in the Central Valley Region (July 1-September 15, 1999)



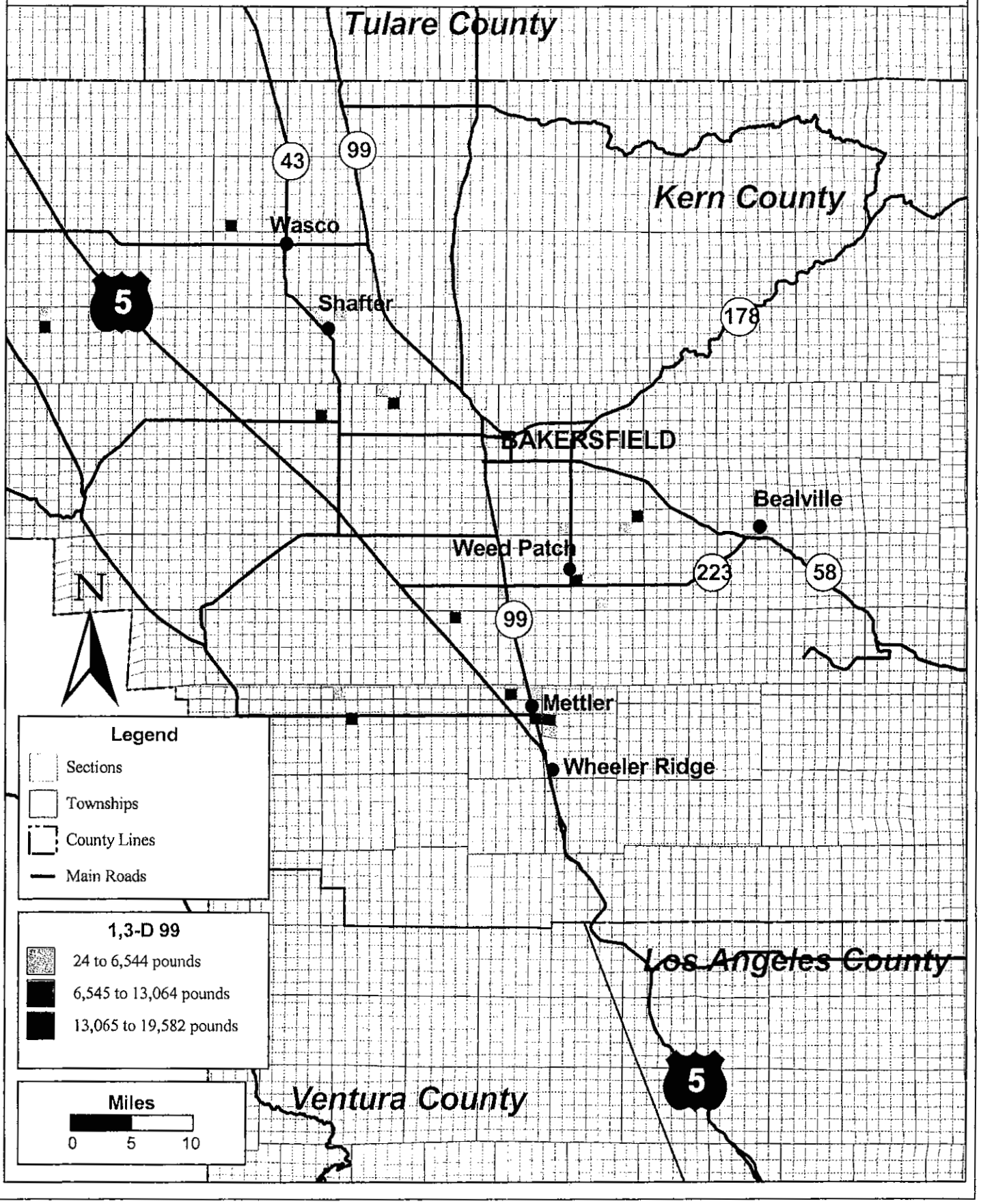
Attachment G (1): 1998 Metam-Sodium Use in the Central Valley Region (July 1-September 15, 1998)



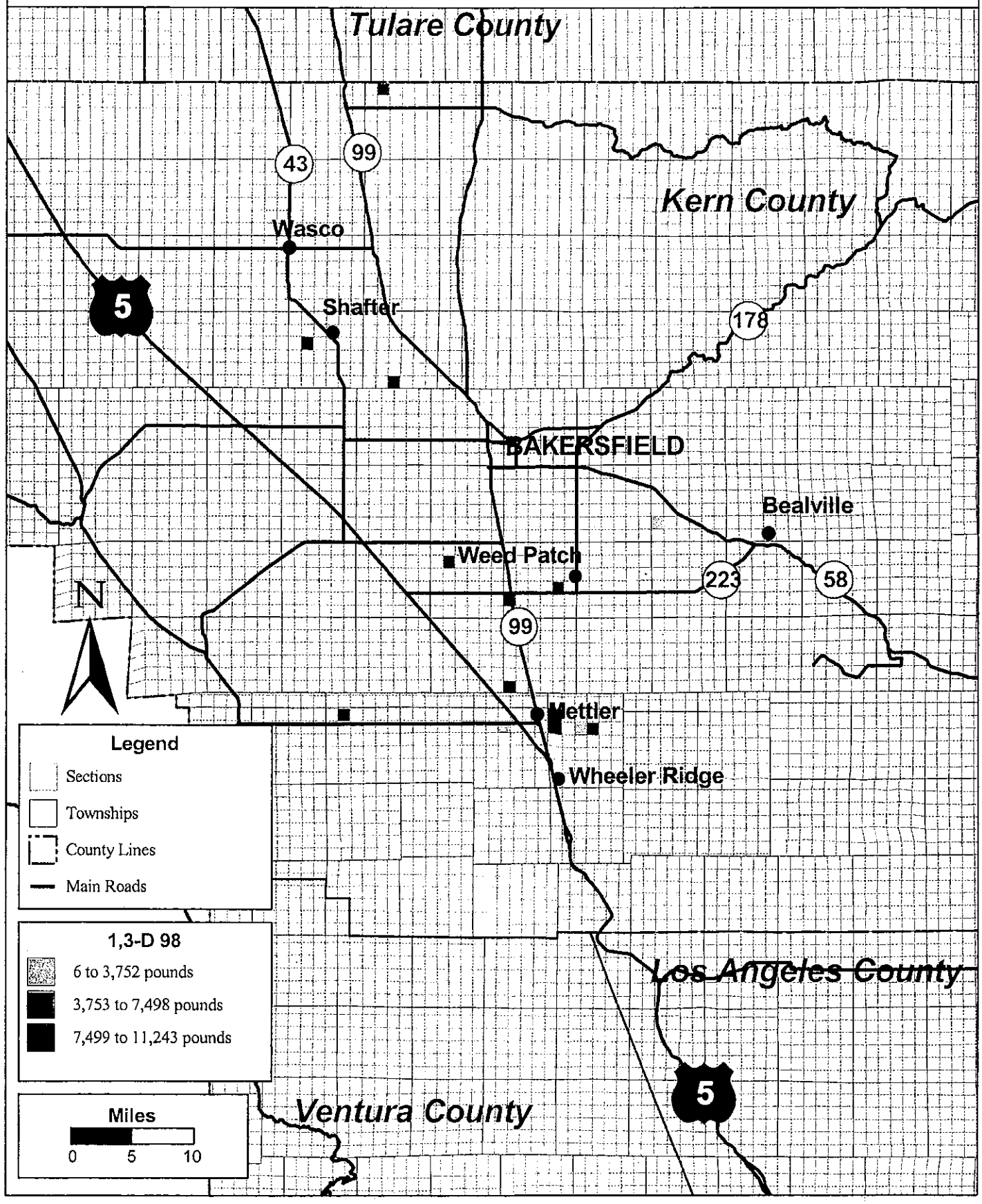
Attachment G (2): 1999 Metam-Sodium Use in the Central Valley Region (July 1-September 15, 1999)



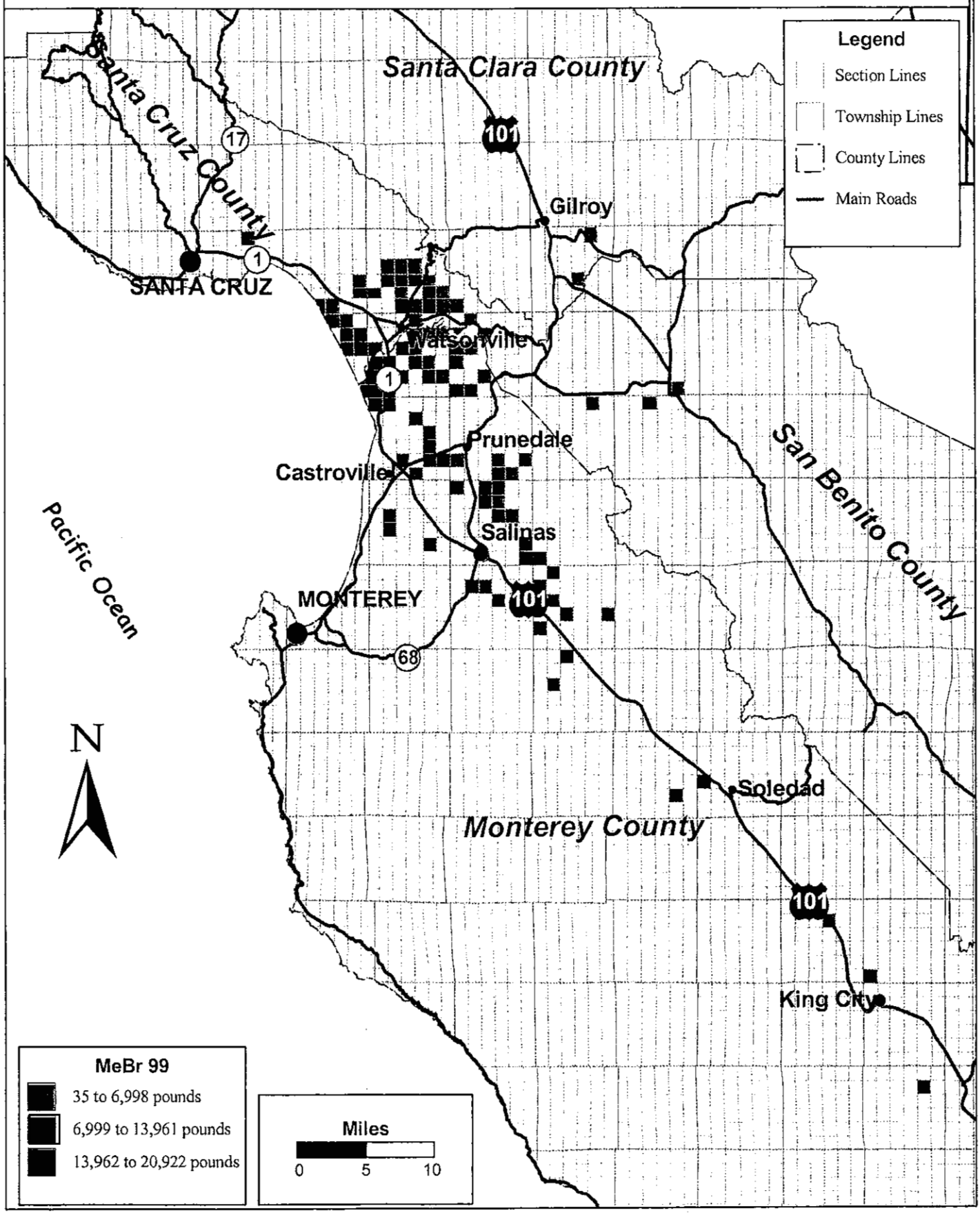
Attachment E (2): 1999 1,3-Dichloropropene Use in the Central Valley Region (July 1-September 15, 1999)



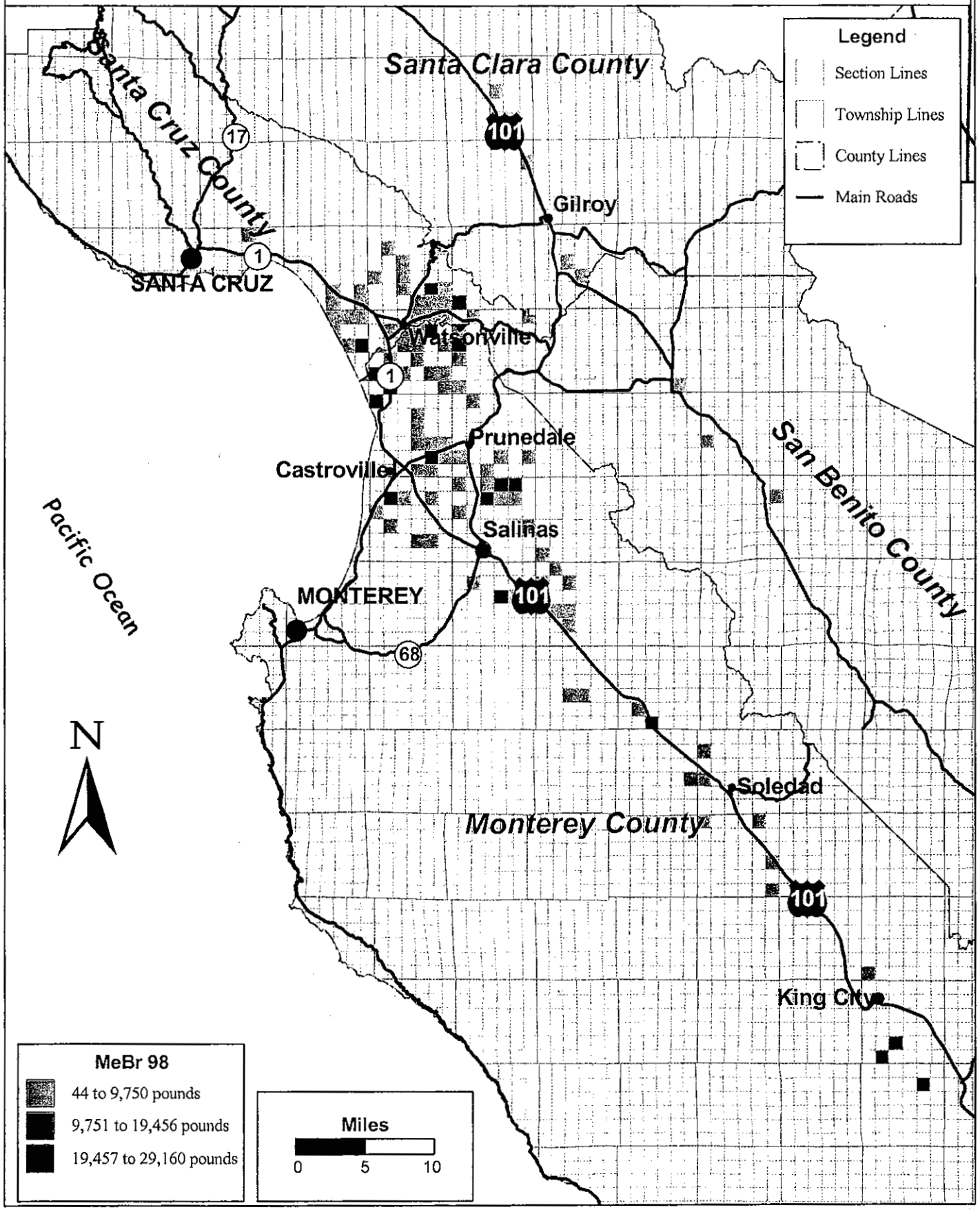
Attachment E (1): 1998 1,3-Dichloropropene Use in the Central Valley Region (July 1-September 15, 1998)



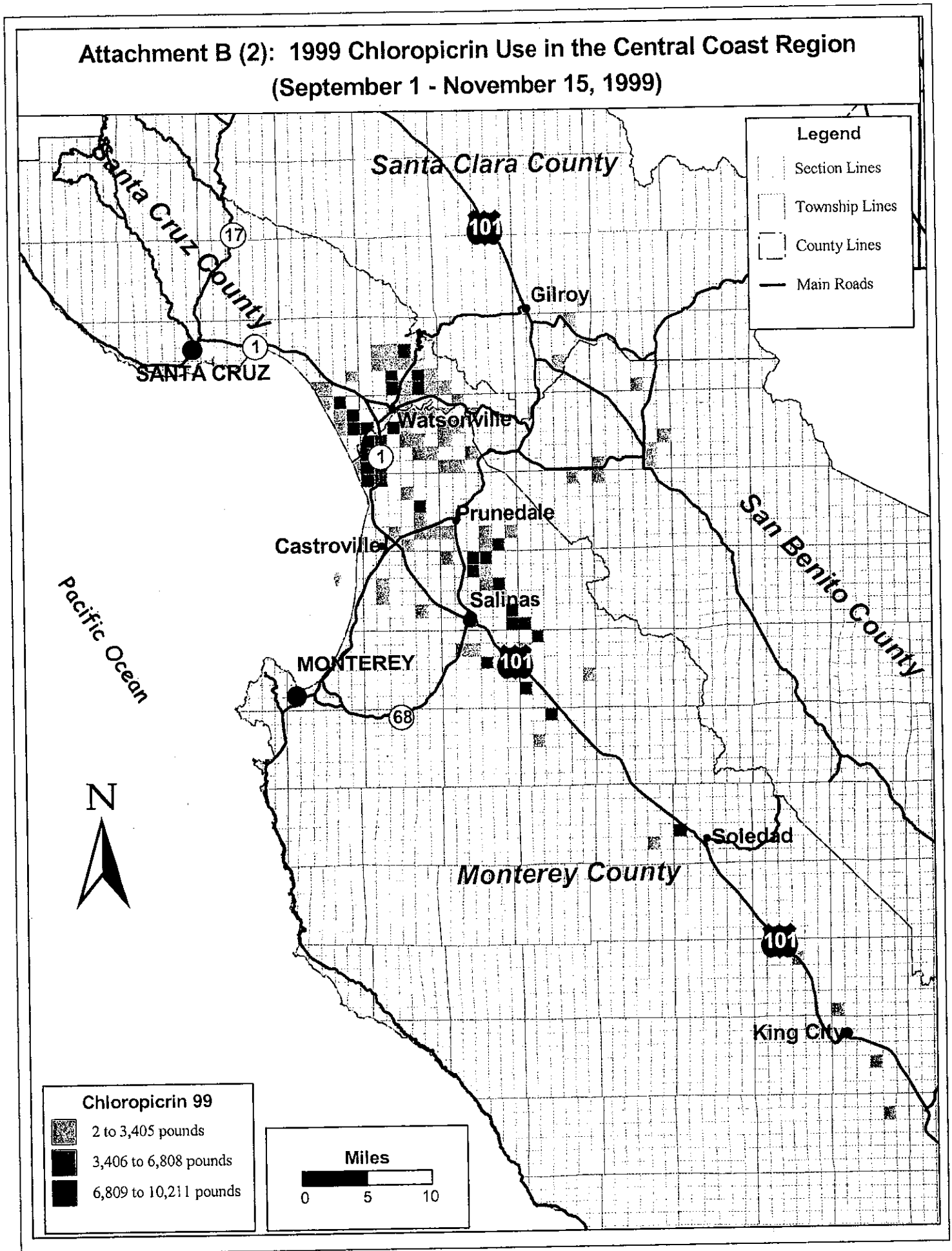
Attachment D (2): 1999 Methyl Bromide Use in the Central Coast Region (September 1 - November 15, 1999)

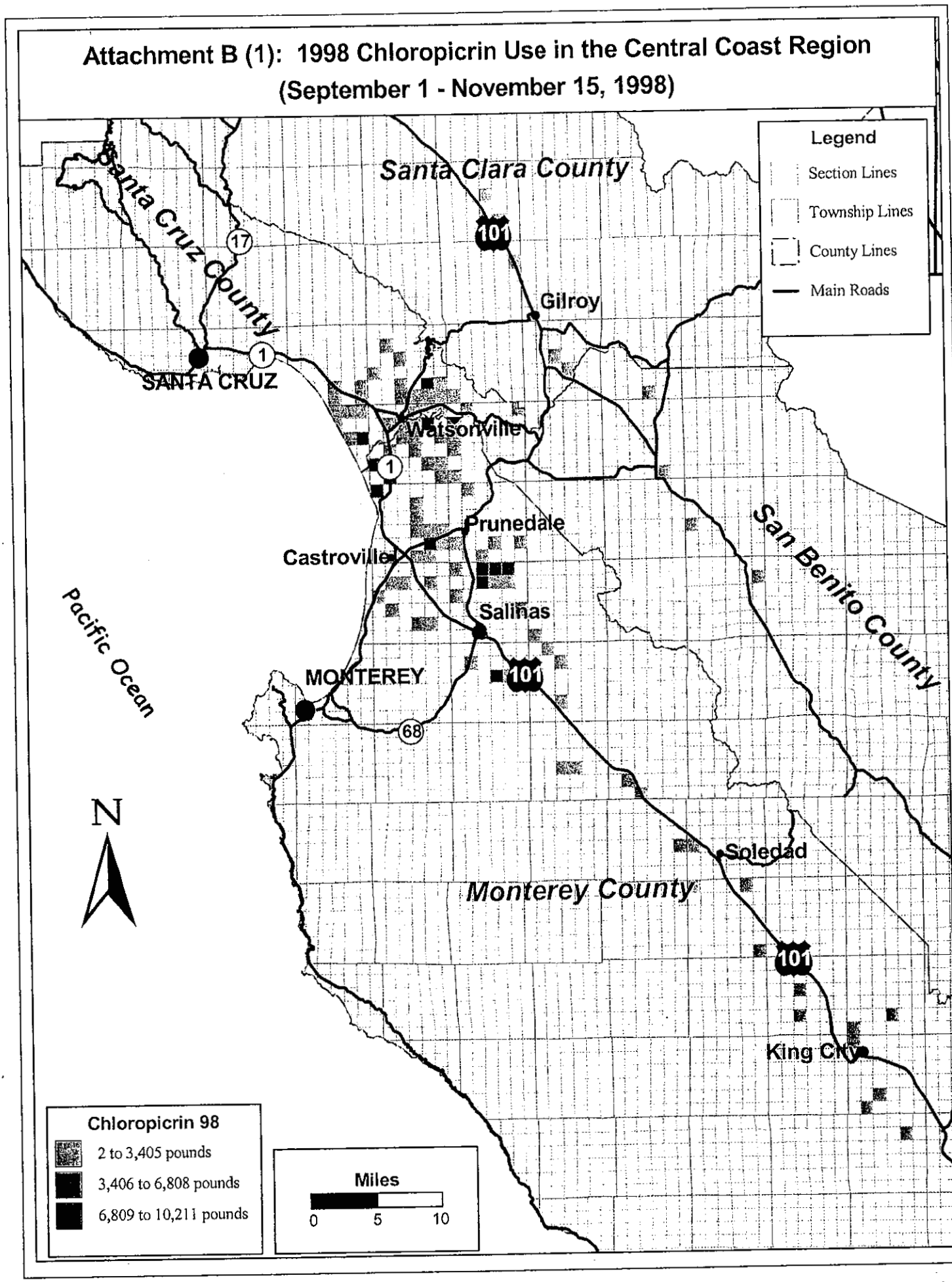


Attachment D (1): 1998 Methyl Bromide Use in the Central Coast Region (September 1 - November 15, 1998)

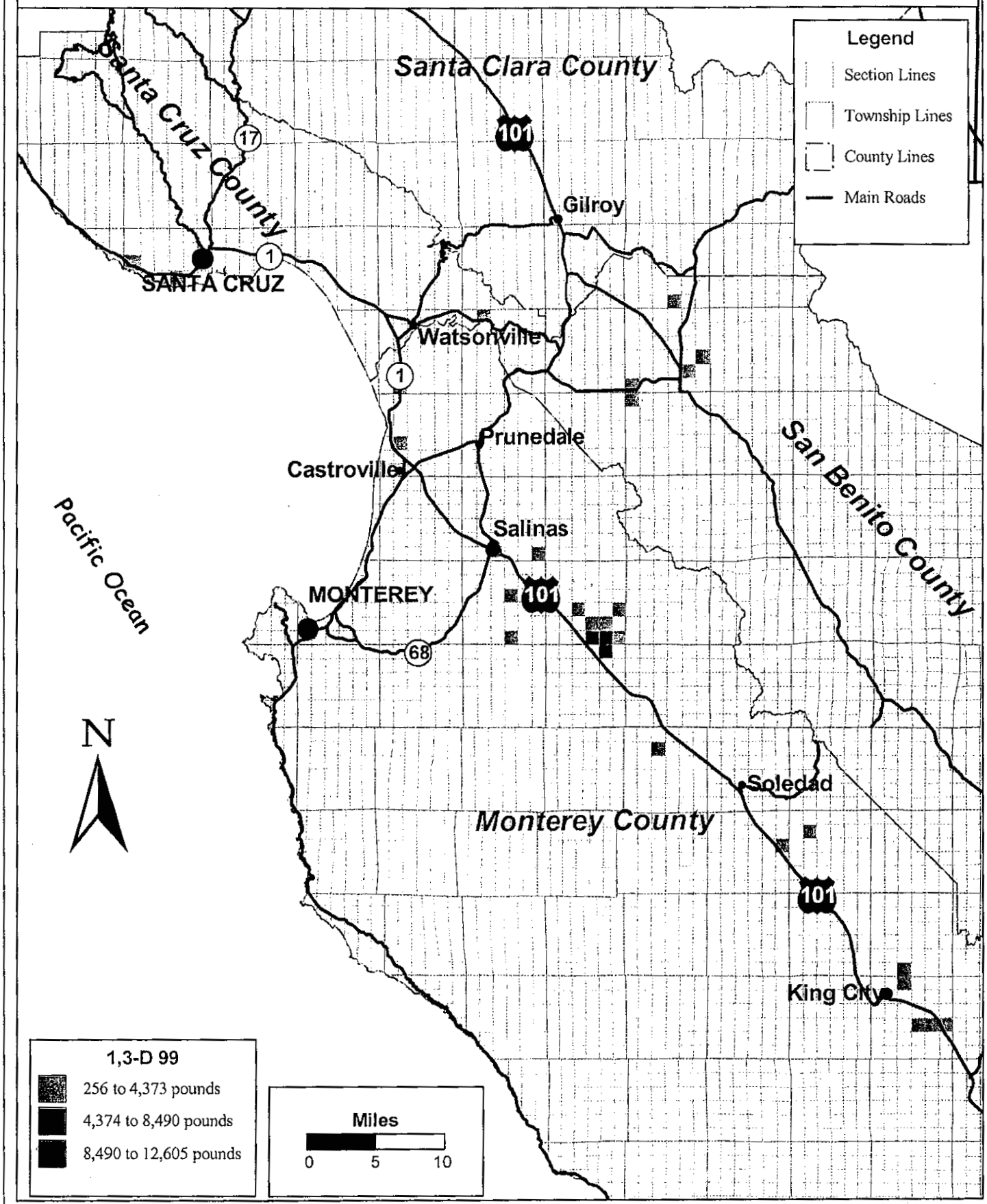


Attachment B (2): 1999 Chloropicrin Use in the Central Coast Region
(September 1 - November 15, 1999)

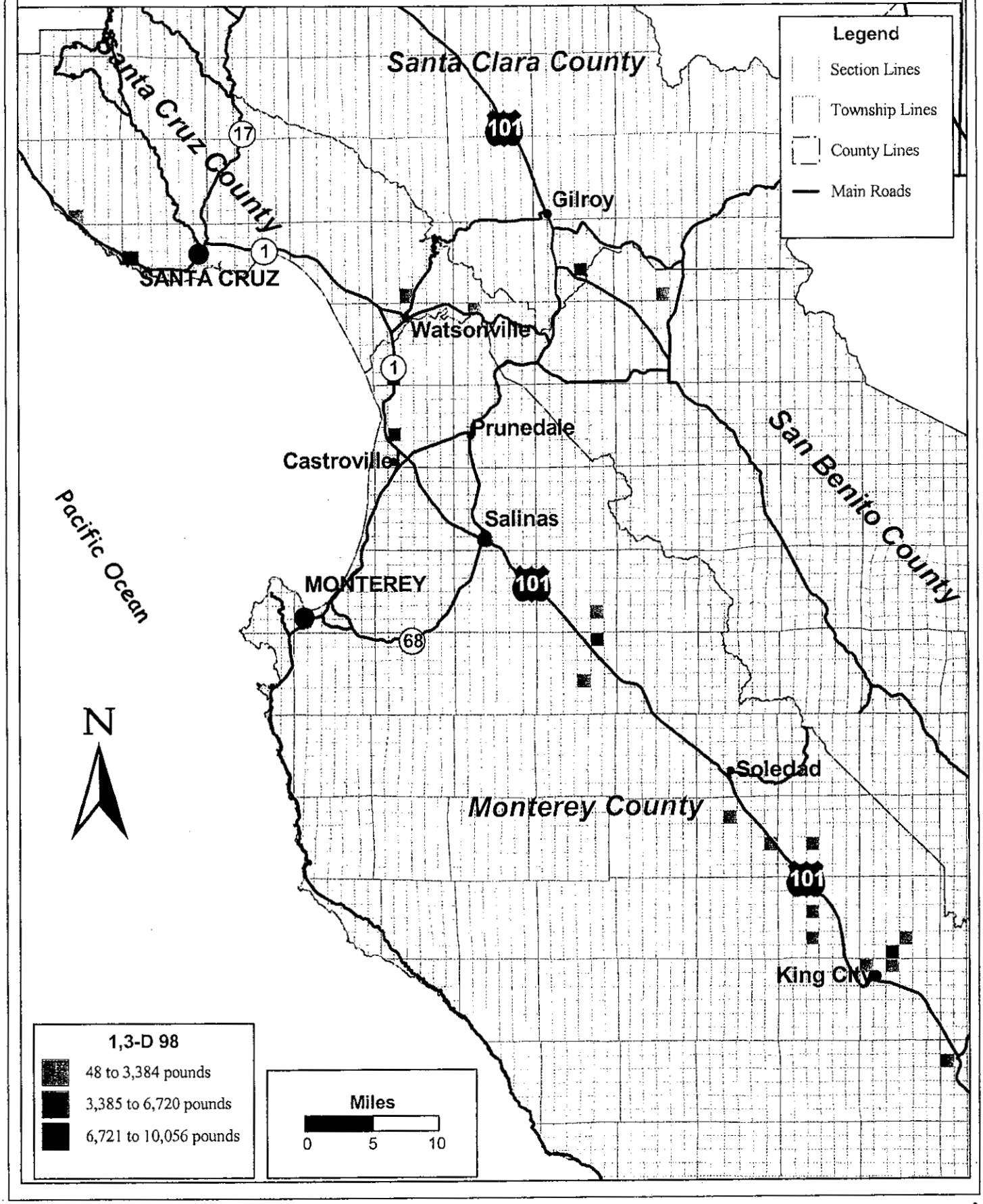



Attachment B (1): 1998 Chloropicrin Use in the Central Coast Region
(September 1 - November 15, 1998)
Legend
Section Lines
Township Lines
County Lines
Main Roads
Santa Clara County
Santa Cruz County
Gilroy
SANTA CRUZ
Watsonville
Prunedale
Castroville
Salinas
San Benito County
Pacific Ocean
MONTEREY
Soledad
Monterey County
King City
101
17
1
68
N
Chloropicrin 98
2 to 3,405 pounds
3,406 to 6,808 pounds
6,809 to 10,211 pounds
Miles
0
5
10

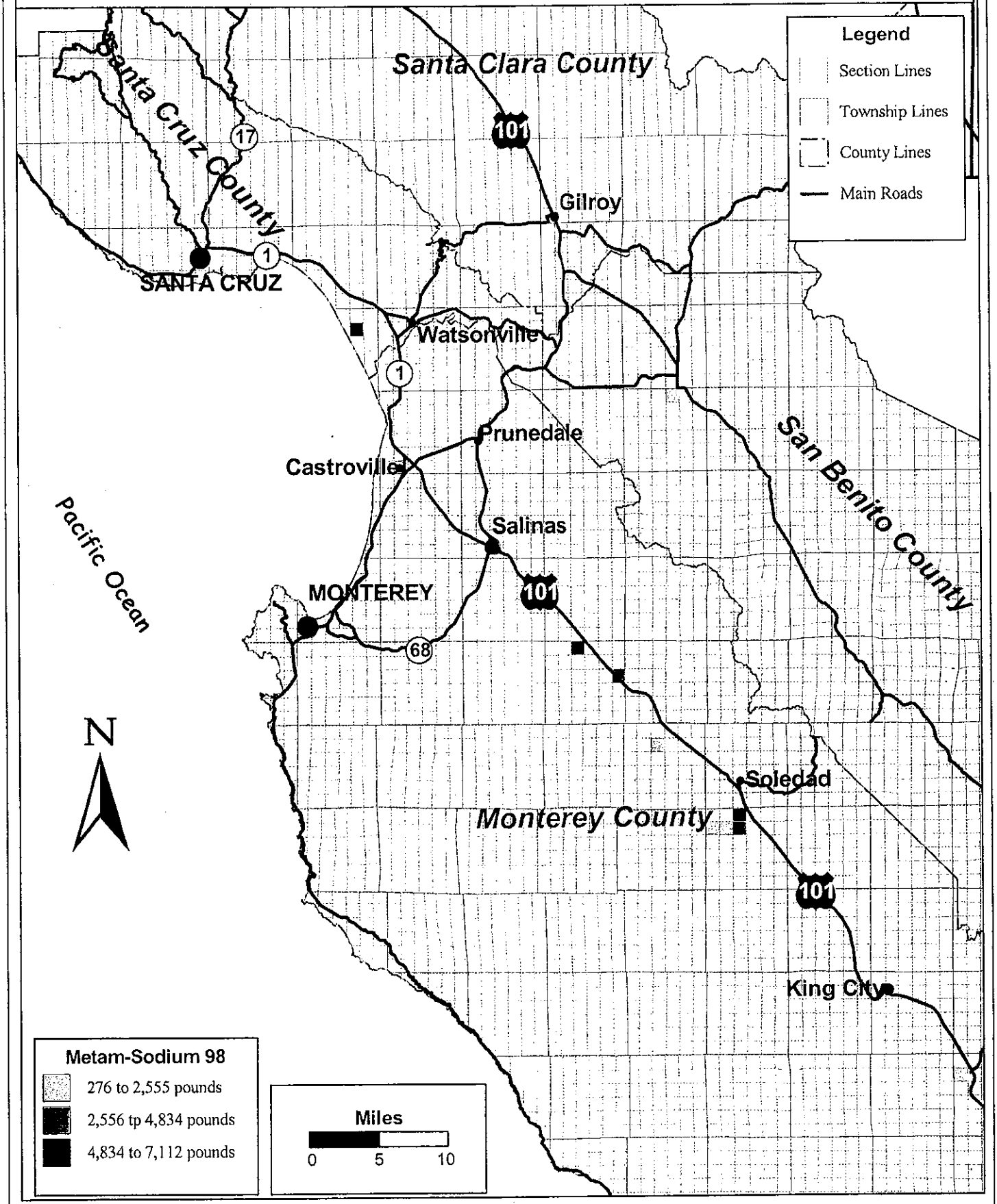
Attachment A (2): 1999 1,3-Dichloropropene Use in the Central Coast Region (September 1 - November 15, 1999)



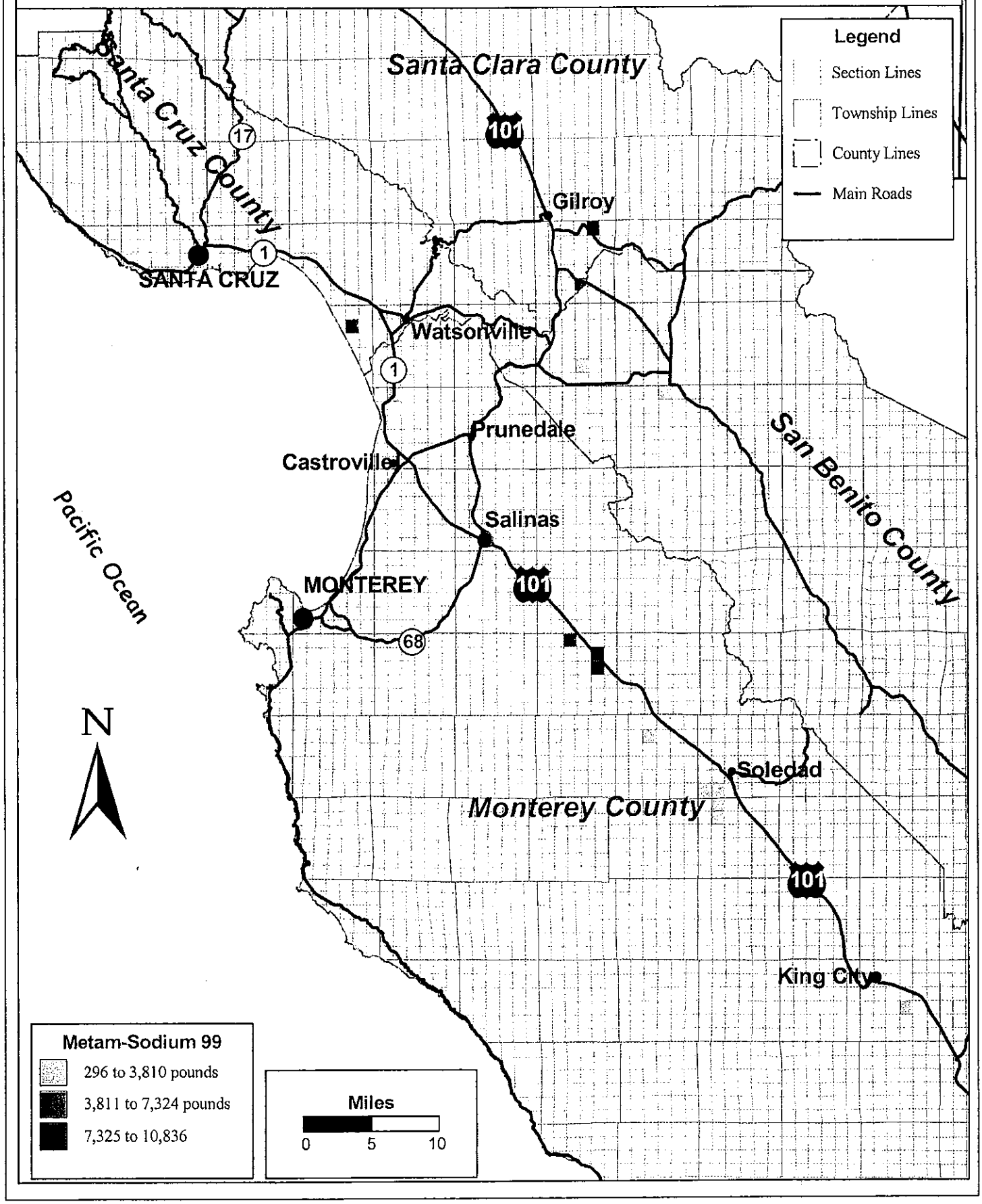
Attachment A (1): 1998 1,3-Dichloropropene Use in the Central Coast Region (September 1 - November 15, 1998)



Attachment C (1): 1998 Metam-Sodium Use in the Central Coast Region (September 1 - November 15, 1998)



Attachment C (2): 1999 Metam-Sodium Use in the Central Coast Region (September 1 - November 15, 1999)



APPENDIX IV

CANISTER AMBIENT FIELD LOG SHEETS

SAMPLE FIELD LOG SHEET FOR CANISTERS

Project # P-01-004

Ambient Monitoring for MeBr/Telone in Monterey and Santa Cruz Counties

Sample Log Number	Sample Name	Sampler ID Number	Silco Canister Number	Sample Start				Sample Stop				Comments Including Weather Status	Sampler's Initials
				Date	Time (PST)	Guage ("Hg)	Flowrate Initial / Start	Date	Time (PST)	Guage ("Hg)	Flowrate (sccm)	Start / Stop	Start / Stop
001	SALC 1	6	1177	9/8/01	0639	-27	3.7 / 3	9/9/01	0643	-7.8	3.1	C / C	AE / JRR
002	SALC 1C	15	1111	9/8/01	0647	-29	3.6 / 3	9/9/01	0650	-9.5	2.9	C / C	AC / JRR
003	CHUC 1	11	1103	9/8/01	0727	-29	3.7 / 3	9/9/01	0736	-10.0	2.8	C / C	AE / JRR
004	CHUC 1C	14	1125	9/8/01	0731	-30	3.7 / 3	9/9/01	0742	-10.5	2.8	C / C	AE / JRR
005	LJEC 1	2	1086	9/8/01	0808	-28	3.4 / 3	9/9/01	0822	-8.0	2.9	C / C	AE / JRR
006	LJEC 1C	7	1186	9/8/01	0811	-28	4.0 / 3	9/9/01	0828	-6.5	2.8	C / C	AE / JRR
007	PMSC 1	4	1110	9/8/01	0857	-30	3.4 / 3	9/9/01	0911	-9.5	3.0	C / C	AE / JRR
008	PMSC 1C	8	1182	9/8/01	0901	-28	3.6 / 3	9/9/01	0918	-8.0	3.0	C / C	AE / JRR
009	MKSC 1	5	1179	9/8/01	0934	-29	3.9 / 3	9/9/01	0954	-6.5	2.8	C / C	AE / JRR
010	MKSC 1C	9	1135	9/8/01	0940	<-30	3.3 / 3	9/9/01	0959	-9.0	3.0	C / C	AE / JRR
011	SESC 1	17	1185	9/8/01	1005	-29	3.6 / 3	9/9/01	1031	-8.0	2.9	PC / C	AE / JRR
012	SESC 1C	10	1147	9/8/01	1010	-28	5.0 / 3	9/9/01	1038	-4.0	3.0	PC / C	AE / JRR
013	SALC-2	6	1042	9/9/01	0646	-27.0	2.9 / 3.0	9/10/01	0657	-8	3.0	C / C	JRR / AE
014	CHUC-2	11	1171	9/9/01	0738	-28.5	2.8 / 3.0	9/10/01	0732	-9	3.0	C / C	JRR / AC
015	LJEC-2	2	1085	9/9/01	0824	-29.5	2.8 / 3.0	9/10/01	0822	-8	3.0	C / P	JRR / AE
016	PMSC-2	4	1150	9/9/01	0914	<-30	2.9 / 3.0	9/10/01	0921	-8	3.0	C / P	JRR / AC
017	MESC-2	5	1052	9/9/01	0956	-30.0	2.8 / 3.0	9/10/01	1008	-7.5	2.8	C / P	JRR / JRR
018	SESC-2	17	1153	9/9/01	1035	-29.0	3.0 / 3.0	9/10/01	1041	-10	2.7	C / P	JRR / AE
019	SESC-2FB	—	1132	9/9/01	1044	—	— / —	—	—	—	—	C / —	JRR / —
020	SALC-3	6	1118	9/10/01	0706	-27	2.9 / 3.0	9/11/01	0649	-8	3.0	C / P	AC / AC
021	CHUC-3	11	1074	9/10/01	0734	-28	3.0 / 3.0	9/11/01	0741	-9	3.0	C / P	AE / AE
022	LSEC-3	2	1145	9/10/01	0825	-28	2.9 / 3.0	9/11/01	0836	-7	3.0	P / K	AE / AE

MFM Used # 5399

Weather Codes: K = Clear, P = Partly Cloudy, C = Cloudy, F = Foggy, & R = Raining.

NOTE A. MFM BAD
FLOW RATE PROBABLY GOOD.

NOTE B. MFM BAD. ADJUSTED CANISTER WITH BAD MFM. FLOW RATES NOT VALID.

SAMPLE FIELD LOG SHEET FOR CANISTERS

Project # P-01-004

Ambient Monitoring for MeBr/Telone in Monterey and Santa Cruz Counties

MFM # 5399

Sample Log Number	Sample Name	Sampler ID Number	Silco Canister Number	Sample Start Date	Sample Start Time (PST)	Sample Start Guage ("Hg)	Sample Start Flowrate Initial / Start	Sample Stop Date	Sample Stop Time (PST)	Sample Stop Guage ("Hg)	Sample Stop Flowrate (sccm)	Comments Including Weather Status Start / Stop	Sampler's Initials Start / Stop	
* 023	PMSC-3	4	1184	9/10/01	0924	<-30	2.9 / 3.0	9/11/01	0938	-8	1.9	P / K	AK / AK	A.
* 024	MESC-3	5	1129	9/10/01	1010	-30	2.7 / 3.0	9/11/01	1027	-7	1.8	P / K	AK / AK	A.
* 025	SESC-3	17	1054	9/10/01	1043	-30	2.5 / 3.0	9/11/01	1103	-7	1.5	P HARD TO TOUCH /	AK /	A.
* 026	SALC-4	6	1072	9/11/01	0652	-27	3.0 / 3.0	9/12/01	0649	-7	2.0	P / R	AK / AK	A.
027	CHUC-4	11	1166	9/11/01	0743	-29	3.0 / 3.0	9/12/01	0739	-9	2.2	P / C	AK / AK	A.
028	LJEC-4	2	1093	9/11/01	0839	-30	2.7 / 3.0	9/12/01	0832	-6	2.3	K / C	AK / AK	A.
029	PMSC-4	4	1156	9/11/01	0940	<-30	1.7 / 3.0	9/12/01	0907	0	0	K / C	AK / AK	B.
030	MESC-4	5	1112	9/11/01	1029	-30	1.8 / 3.0	9/12/01	1000	-2	.4	K / K	AK / AK	B.
* 031	SESC-4	17	1050	9/11/01	1111	<-30	2.0 /	COULD NOT ADJUST ABOVE				2.3 /		
032	SESC-4	10	1050	9/11/01	1119	-29	2.3 / 3.0	9/12/01	1043	+.5	1.1	K / K	AK / AK	B.
033	SALC-5	6	1122	9/17/01	0638	-27	3.1 / 3.0	9/18/01	0625	-8.0	3.0	OC / F	AK / JW	
034	SALC-5C	1	1059	9/17/01	0644	-26	4.0 / 3.0	9/18/01	0627	-8.0	3.0	OC / F	AK / JW	
035	CHUC-5	11	1183	9/17/01	0719	-28	3.2 / 3.0	9/18/01	0711	-9.2	2.96	OC / F	AK / JW	
036	CHUC-5C	14	1163	9/17/01	0723	-30	3.1 / 3.0	9/18/01	0719	-11.0	2.90	OC / F	AK / JW	
037	LJEC-5	2	1142	9/17/01	0803	-29	3.4 / 3.0	9/18/01	1017	-6.0	2.91	OC / C	AK / JW	
038	LJEC-5C	7	1123	9/17/01	0806	-28	3.0 / 3.0	9/18/01	1018	-5.8	2.93	OC / C	AK / JW	
039	PMSC-5	4	1080	9/17/01	0852	-30	4.9 / 3.0	9/18/01	1104	-9.0	3.12	OC / C	AK / JW	
040	PMSC-5C	8	1127	9/17/01	0854	-29	3 / 3.0	9/18/01	1105	-6.3	2.98	OC / C	AK / JW	
041	MESC-5	9	1073	9/17/01	0919	<-30	3.0 / 3.0	9/18/01	1135	-4.0	2.39	OC / C	AK / JW	
042	MESC-5C	5	1137	9/17/01	0921	-30	4.8 / 3.0	9/18/01	1134	-7.5	2.45	OC / C	AK / JW	
043	SESC-5	15	1152	9/17/01	0939	-29	2.9 / 3.0	9/18/01	1206	-7.5	2.6	OC / C	AK / JW	
044	SESC-5C	10	1131	9/17/01	0944	-27	4.8 / 3.0	9/18/01	1207	-2	2.6	OC / C	AK / JW	

MFM Used # 5399

Weather Codes: K = Clear, P = Partly Cloudy, C = Cloudy, F = Foggy, & R = Raining.

TLO

SAMPLE FIELD LOG SHEET FOR CANISTERS

Project # P-01-004

Ambient Monitoring for MeBr/Telone in Monterey and Santa Cruz Counties

NOTE: * GUAGE READS LOW - checked against next station w/ some canisters.

Sample Log Number	Sample Name	Sampler ID Number	Silco Canister Number	Sample Start				Sample Stop				Comments Including Weather Status	Sampler's Initials
				Date	Time (PST)	Guage ("Hg)	Flowrate Initial / Start	Date	Time (PST)	Guage ("Hg)	Flowrate (sccm)	Start / Stop	Start / Stop
045	SALC-6	6	1099	9/18/01	0630	-26.8	2.97 / 2.97	9/19/01	0720	-7	3.0	F / F	JW / AC
046	SALC-6FS	1	1051	9/18/01	0639	-25.3	2.97 / 2.97	9/19/01	0720	-6	3.0	F / F	JW / AC
047	SALC-6TS	—	1055	9/18/01	0615	—	— / —	—	—	—	—	OC	JW / —
048	CHUC-6	11	1146	9/18/01	0714	-28.5	3.0 / 3.0	9/19/01	0757	-8	3.0	F / F	JW / AC
049	LJEC-6	7	1065	9/18/01	1024	-29.0	3.0 / 3.0	9/19/01	0929	-6	3.1	C / F	JW / AC
050	PMSC-6	4	1094	9/18/01	1109	<-30.0	2.98 / 3.0	9/19/01	1009	-11	3.1	C / C	JW / AC
051	MESC-6	9	1104	9/18/01	1140	<-30.0	2.96 / 3.0	9/19/01	1040	-9	3.0	C / C	JW / AC
052	SESC-6	15	1062	9/18/01	1237	-30	2.7 / 3.0	9/19/01	1137	-10	2.8	C / PC	JW / AC
053	SALC-7	6	1098	9/22/01	0653	-26.7	3.0 / 3.0	9/23/01	0653	-8.0	3.0	F / C	JW / JW
054	CHUC-7	11	1075	9/22/01	0738	-28.3	3.1 / 3.0	9/23/01	0752	-10.0	2.9	F / C	JW / JW
055	LJEC-7	7	1089	9/22/01	0827	-29.0	3.1 / 3.0	9/23/01	0847	~~-29.5~~ JW -6	3.1	F / C	JW / JW
056	PMSC-7	4	1144	9/22/01	0924	<-30.0	2.8 / 3.0	9/23/01	0941	-10.0	3.2	PC / C	JW / JW
057	MESC-7	9	1107	9/22/01	1034	<-30.0	2.5 / 3.0	9/23/01	1033	-6.5	3.3	PC / PC	JW / JW
058	SESC-7	15	1161	9/22/01	1107	<-30.0	2.7 / 3.0	9/23/01	1115	-8.6	2.7	PC / PC	JW / JW
059	SALC-8	6	1175	9/23/01	0658	-27.0	3.0 / 3.0	9/24/01	0720	-8.0	3.0	C / C	JW / JW *
060	CHUC-8	11	1126	9/23/01	0754	-29.5	2.9 / 3.0	9/24/01	0755	-8.4	3.0	C / C	JW / JW
061	LJEC-8	7	1169	9/23/01	0850	-29.0	3.0 / 3.0	9/24/01	0855	-6.0	3.2	C / C	JW / JW
062	PMSC-8	4	1056	9/23/01	0944	<-30	3.0 / 3.0	9/24/01	0958	-8.5	3.1	C / C	JW / JW
063	MESC-8	9	1100	9/23/01	1035	<-30	3.2 / 3.0	9/24/01	1041	-6.8	3.3	PC / C	JW / JW
064	SESC-8	15	1083	9/23/01	1120	<-30	2.8 / 3.0	9/24/01	1115	-8.0	2.3	PC / C	JW / JW
065	SALC-8TB	—	1178	9/24/01	0658	—	— / —	—	—	—	—	C /	JW / —
066	SALC-9	6	1187	9/24/01	0704	-26.5	2.9 / 3.0	9/25/01	0654	-7.5	2.9	C / K *	JW / JW **

MFM Used # 5399

Weather Codes: K = Clear, P = Partly Cloudy, C = Cloudy, F = Foggy, & R = Raining.

* RAIN OVERNIGHT

111

SAMPLE FIELD LOG SHEET FOR CANISTERS

Project # P-01-004

Ambient Monitoring for MeBr/Telone in Monterey and Santa Cruz Counties

(2) GAUGE READS LOW

NOTE 1: CHANGE SAMPLER 15 TO 18

Sample Log Number	Sample Name	Sampler ID Number	Silco Canister Number	Sample Start				Sample Stop				Comments Including Weather Status	Sampler's Initials	
				Date	Time (PST)	Guage ("Hg)	Flowrate Initial / Start	Date	Time (PST)	Guage ("Hg)	Flowrate (sccm)	Start / Stop	Start / Stop	
067	CHUC-9	11	1138	9/24/01	0757	-28.5	3.0 / 3.0	9/25/01	0747	-9.2	3.0	C / F	JW / JW	
068	LJEC-9	7	1090	9/24/01	0858	-28.0	3.0 / 3.0	9/25/01	0903	-5.0	2.9	C / K	JW / JW	
069	PMSC-9	4	1057	9/24/01	0959	<-30	3.0 / 3.0	9/25/01	0957	-11.0	3.0	C / K	JW / JW	
070	MESC-9	9	1162	9/24/01	1045	<-30	3.1 / 3.0	9/25/01	1050	-8.0	3.0	C / K	JW / JW	
071	SESC-9	~~15~~ 18	1113	9/24/01	1123	-30.0	2.3 / 3.0	9/25/01	1123	-8.0	2.7	C / K	JW / JW	NOTE (1)
072	SALC-10	6	1097	9/25/01	0700	-27.0	2.9 / 3.0	9/26/01	0652	-7.5	2.9	C (NITE RAIN) / K	JW / AQP	(2)
073	CHUC-10	11	1108	9/25/01	0751	-28.5	3.0 / 3.0	9/26/01	0742	-9.0	2.9	F / K	JW / AQP	
074	LJEC-10	7	1061	9/25/01	0906	-28.5	2.9 / 3.0	9/26/01	0826	-6.0	3.2	K / K	JW / AQP	
075	PMSC-10	4	1196	9/25/01	1004	<-30.	2.9 / 3.0	9/26/01	0938	-10.0	3.1	K / K	JW / AQP	
076	MESC-10	9	1180	9/25/01	1054	<-30	2.7 / 3.0	9/26/01	1020	-6.0	2.4	K / K	JW / AQP	
077	SESC-10	18	1092	9/25/01	1126	<-30	2.7 / 3.0	9/26/01	1105	-8.0	2.5	K / K	JW / AQP	
078	SALC-11	6	1078	9/26/01	0659	-27.0	2.8 / 3.0	9/27/01	0634	-7.5	3.2	K / PC	AQP / JW	(2)
079	CHUC-11	11	1158	9/26/01	0748	-29.5	2.9 / 3.0	9/27/01	0721	-8.6	3.1	K / P	AQP / JW	
080	LJEC-11	7	1060	9/26/01	0832	-28.0	3.1 / 3.0	9/27/01	0808	-6.0	3.2	K / F	AQP / JW	
081	PMSC-11	4	1125	9/26/01	0943	<-30	3.0 / 3.0	9/27/01	0856	-9.6	3.0	K / OC	AQP / JW	
082	MESC-11	9	1173	9/26/01	1024	<-30	3.0 / 3.0	9/27/01	0941	-6.3	3.4	K / OC	AQP / JW	
083	SESC-11	18	1133	9/26/01	1110	<-30	3.0 / 3.0	9/27/01	1027	-8.3	2.8	K / P	AQP / JW	
084	SALC-12	6	1070	9/27/01	0637	-27	3.1 / 3.0	9/28/01	0651	-6.0	3.2	PC / K	JW / AQP	(2)
085	CHUC-12	11	1139	9/27/01	0725	-28.6	3.1 / 3.0	9/28/01	0724	-5.0	3.0	P / K	JW / AQP	
086	LJEC-12	7	1179	9/27/01	0812	-29.0	3.0 / 3.0	9/28/01	0804	-6.0	3.1 / 3.2 AQP	F / K	JW / AQP	
087	PMSC-12	4	1087	9/27/01	0859	<-30	2.9 / 3.0	9/28/01	0842	-9.0	3.2	OC / K	JW / AQP	
088	MESC-12	9	1130	9/27/01	0944	<-30	3.3 / 3.0	9/28/01	0914	-8.0	3.2	OC / K	JW / AQP	

MFM Used # 5399

Weather Codes: K = Clear, P = Partly Cloudy, C = Cloudy, F = Foggy, & R = Raining.

SAMPLE FIELD LOG SHEET FOR CANISTERS

Project # P-01-004

Ambient Monitoring for MeBr/Telone in Monterey and Santa Cruz Counties NOTE (2) GAUGE READS LOW

Sample Log Number	Sample Name	Sampler ID Number	Silco Canister Number	Sample Start				Sample Stop				Comments Including Weather Status	Sampler's Initials
				Date	Time (PST)	Guage ("Hg)	Flowrate Initial / Start	Date	Time (PST)	Guage ("Hg)	Flowrate (sccm)	Start / Stop	Start / Stop
089	SESC-12	~~10~~ 18	1076	9/27/01	1031	-30.0	2.8 / 3.0	9/28/01	0942	-8.0	2.9	P / K	JW / qp
090	SALC-13	6	1050	10/3/01	0711	-27.6	3.0 / 3.0	10/4/01	0707	-6.5	3.1	F / OC (2)	qp / qp
091	SALC-13C	1	1183	10/3/01	0715	-26.0	3.0 / 3.0	10/4/01	0713	-7.5	3.0	F / OC	qp / qp
092	CHUC-13	11	1150	10/3/01	0803	-29.0	3.1 / 3.0	10/4/01	0816	-12.0	2.9	F / OC	qp / qp
093	CHUC-13C	14	1042	10/3/01	0810	-30.0	3.0 / 3.0	10/4/01	0823	-10.5	2.9	F / OC	qp / qp
094	LJEC-13	2	1166	10/3/01	0854	-29.5	3.0 / 3.0	10/4/01	0918	-8.0	3.0	OC / OC	qp / qp
095	LJEC-13C	7	1072	10/3/01	0858	-28.0	3.1 / 3.0	10/4/01	0925	-6.0	3.0	OC / OC	qp / qp
096	PMSC-13	4	1182	10/3/01	0946	<-30.0	3.1 / 3.0	10/4/01	1019	-7.0	3.2	OC / OC	qp / qp
097	PMSC-13C	8	1132	10/3/01	0953	-29.5	2.9 / 3.0	10/4/01	1025	-7.5	3.1	OC / OC	qp / qp
098	MESC-13	9	1164	10/3/01	1046	<-30.0	3.0 / 3.0	10/4/01	1117	-6.0	3.3	K / P	qp / qp
099	MESC-13C	5	1088	10/3/01	1051	-30.0	3.0 / 3.0	10/4/01	1124	-6.0	3.2	K / P	qp / qp
100	SESC-13	18	1149	10/3/01	1133	-30.0	2.8 / 3.0	10/4/01	1215	-6.0	2.4	K / P	qp / qp
101	SESC-13C	10	1074	10/3/01	1138	-29.0	3.0 / 3.0	10/4/01	1222	-7.0	2.8	K / P	qp / qp
102	SALC-14	6	1128	10/4/01	0711	-27.0	3.0 / 3.0	10/5/01	0620	-7.0	3.1	OC / OC (2)	qp / qp
103	SALC-14FS	1	1136	10/4/01	0718	-25.5	3.0 / 3.0	10/5/01	0627	-7.0	3.0	OC / OC	qp / qp
104	SALC-14TS	—	1145	10/4/01	0748	—	—	—	—	—	—	OC	qp / qp
105	SALC-14TB	—	1067	10/4/01	0750	—	—	—	—	—	—	OC	qp / qp
106	CHUC-14	11	1053	10/4/01	0820	-29.0	2.9 / 3.0	10/5/01	0733	-2.0	1.9	OC / OC	qp / qp
107	LJEC-14	2	1058	10/4/01	0923	-29.0	3.0 / 3.0	10/5/01	0840	-9.0	2.9	OC / OC	qp / qp
108	PMSC-14	4	1110	10/4/01	1023	-30.5	3.1 / 3.0	10/5/01	0953	-8.0	3.1	OC / OC	qp / qp
109	MESC-14	9	1129	10/4/01	1123	<-30	3.0 / 3.0	10/5/01	1054	-7.0	3.3	P / OC	qp / qp
110	SESC-14	18	1112	10/4/01	1218	-29.5	3.0 / 3.0	10/5/01	1214	-7.0	2.8	P / OC	qp / qp

MFM Used # 5399

Weather Codes: K = Clear, P = Partly Cloudy, C = Cloudy, F = Foggy, & R = Raining.

SAMPLE FIELD LOG SHEET FOR CANISTERS

Project # P-01-004

Ambient Monitoring for MeBr/Telone in Monterey and Santa Cruz Counties

NOTE: 2 : GUAGE READS LOW

Sample Log Number	Sample Name	Sampler ID Number	Silco Canister Number	Sample Start				Sample Stop				Comments Including Weather Status	Sampler's Initials	
				Date	Time (PST)	Guage ("Hg)	Flowrate Initial / Start	Date	Time (PST)	Guage ("Hg)	Flowrate (sccm)	Start / Stop	Start / Stop	
111	SALC-15	6	1134	10/5/01	0624	-27.0	3.0 / 3.0	10/6/01	0630	-7.0	3.1	OC / OC	CQP / CQP	(2)
112	CHUC-15	11	1086	10/5/01	6737	-29.0	3.0 / 3.0	10/6/01	0731	-8.0	3.0	OC / OC	CQP / CQP	
113	LJEC-15	2	1091	10/5/01	0843	-29.5	2.9 / 3.0	10/6/01	0827	-7.5	3.2	OC / OC	CQP / CQP	
114	PMSC-15	4	1153	10/5/01	0856	-30.5	3.0 / 3.0	10/6/01	0930	-8.0	3.3	OC / OC	CQP / CQP	
115	MESC-15	9	1052	10/5/01	1059	<-30.0	3.1 / 3.0	10/6/01	1019	-8.0	3.4	OC / OC	CQP / CQP	
116	SESC-15	18	1111	10/5/01	1219	-30.0	3.0 / 3.0	10/6/01	1102	-7.5	3.0	OC / OC	CQP / CQP	
117	SALC-16	6	1085	10/6/01	0634	-27.0	3.0 / 3.0	10/7/01	0632	-6.5	3.2	OC / P	CQP / CQP	(2)
118	CHUC-16	11	1177	10/6/01	0735	-29.5	3.0 / 3.0	10/7[illegible]	0726	-8.0	3.1	OC / F	CQP / CQP	
119	LJEC-16	2	1170	10/6/01	0829	-29.5	3.0 / 3.0	10/7/01	0818	-7.5	3.1	OC / OC	CQP / CQP	
120	PMSC-16	4	1136	10/6/01	0933	-30.0	3.0 / 3.0	10/7/01	0924	-8.0	3.2	OC / OC	CQP / CQP	
121	MESC-16	9	1105	10/6/01	1023	<-30.0	3.2 / 3.0	10/7/01	1011	-8.5	3.0	OC / P	CQP / CQP	
122	SESC-16	18	1172	10/6/01	1126	-29.5	3.1 / 3.0	10/7/01	1119	-8.5	3.0	OC / K	CQP / CQP	
123	SALC-17	6	1175	10/11/01	0651	-27	3.2 / 3.0	10/12/01	0634	-8	3.1	K / P	AE / AE	
124	SALC-17C	1	1051	10/11/01	0655	-26	3.2 / 3.0	10/12/01	0636	-8	3.0	K / P	AE / AE	
125	CHUC-17	11	1144	10/11/01	0754	-28	3.3 / 3.0	10/12/01	0801	-9	2.9	K / P (FRONTAGE ROAD REMOVED ABOVE HWY 101)	AE / AE	
126	CHUC-17C	14	1089	10/11/01	0759	-30	3.1 / 3.0	10/12/01	0802	-10	2.9	K 11 / P	AE / AE	
127	LJEC-17	2	1131	10/11/01	0852	-30	/ 3.0	10/12/01	0907	-8	2.9	K / K	AE / AE	
128	LJEC-17C	7	1178	10/11/01	0857	-29	2.8 / 3.0	10/12/01	0910	-6	2.9	K / K	AE / AE	
129	PMSC-17	4	1100	10/11/01	0948	<-30	/ 3.0	10/12/01	1013	-10	2.9	OC / K	AE / AE	
130	PMSC-17C	8	1184	10/11/01	0952	-30	2.8 / 3.0	10/12/01	1015	-7	2.7	OC / K	AE / AE	
131	MESC-17	9	1075	10/11/01	1041	<-30	2.7 / 3.0	10/12/01	1100	-6	2.7	PC / K	AE / AE	
132	MESC-17C	5	1187	10/11/01	1047	<-30	/ 3.0	10/12/01	1102	-6	2.9	PC / K	AE / AE	

MFM Used # 5399

Weather Codes: K = Clear, P = Partly Cloudy, C = Cloudy, F = Foggy, & R = Raining.

SAMPLE FIELD LOG SHEET FOR CANISTERS

Project # P-01-004

Ambient Monitoring for MeBr/Telone in Monterey and Santa Cruz Counties

* LOW FLOW

	Sample Log Number	Sample Name	Sampler ID Number	Silco Canister Number	Sample Start Date	Sample Start Time (PST)	Sample Start Guage ("Hg)	Sample Start Flowrate Initial / Start	Sample Stop Date	Sample Stop Time (PST)	Sample Stop Guage ("Hg)	Sample Stop Flowrate (sccm)	Comments Including Weather Status Start / Stop	Sampler's Initials Start / Stop
	133	SESC17	18	1083	10/11/01	1116	-30	2.7 / 3.0	10/12/01	1144	-7	2.1	PC / K	AC / AC
	134	SESC17C	10	1135	10/11/01	1120	-28	3.1 / 3.0	10/12/01	1146	-4	2.3	PC / K	AC / AC
	135	SALC-18	6	1122	10/12/01	0640	-26	/ 3.0	10/13/01	0636	-7	3.0	P / K	AC / AC
	136	CHUC-18	11	1143	10/12/01	0805	-29	2.9 / 3.0	10/13/01	0746	-8	3.1	P / K	AC / AC
	137	LJEC-18	7	1127	10/12/01	0912	-28	2.8 / 3.0	10/13/01	0856	-6	3.1	K / K	AC / AC
	138	PMSC-18	4	1080	10/12/01	1017	<-30	2.7 / 3.0	10/13/01	1005	-10	3.0	K / K	AC / AC
*	139	MESC-18	9	1073	10/12/01	1104	<-30	2.7 / 3.0	10/13/01	1102	-5	2.0	K / K	AC / AC
*	140	~~SESC~~ SESC-18	18	1161	10/12/01	1202	<-30	2.9 / 3.0	10/13/01	1151	-8	2.2	K / K	AC / AC
	141	SALC-19	6	~~1143~~ 0638	10/13/01	0638	-27	2.9 / 3.0	10/14/01	0648	-8	3.0	K / K	AC / AC
	142	CHUC-19	11	1146	10/13/01	0749	-29	/ 3.0	10/14/01	0741	-7	2.9	K / W	AC / AC
	143	LJEC-19	7	1054	10/13/01	0858	-28	2.9 / 3.0	10/14/01	0841	-4	3.1	K / W	AC / AC
	144	PMSC-19	4	1093	10/13/01	1007	<-30	2.8 / 3.0	10/14/01	0934	-8	3.2	K / K	AC / AC
*	145	MESC-19	9 K	1169	10/13/01	1105	<-30	2.9 / 3.0	10/14/01	1032	-5	1.4	K / K	AC / AC
*	146	SESC-19	18	1098	10/13/01	1153	<-30	2.9 / 3.0	10/14/01	1117	-8	2.1	K / K	AC / AC
	147	SALC-20	6	1142	10/14/01	0650	-27	2.8 / 3.0	10/15/01	0556	-7	3.2	K / K	AC / AC
	148	CHUC-20	11	1104	10/14/01	0744	-28	2.9 / 3.0	10/15/01	0647	-9	3.1	W / K	AC / AC
	149	LJEC-20	7	1168	10/14/01	0842	-28	/ 3.0	10/15/01	0743	-6	3.2	W / K	AC / AC
	150	PMSC-20	4	1056	10/14/01	0936	<-30	/ 3.0	10/15/01	0839	-10	3.1	K / K	AC / AC
	151	MESC-20	5	1138	10/14/01	1036	<-30	2.8 / 3.0	10/15/01	0939	-7	3.3	K / K	AC / AC
*	152	SESC-20	10	1152	10/14/01	1120	<30	2.8 / 3.0	10/15/01	1022	+1	-.99	K / K	AC / AC
	153	SALC-20 TB	—	1186	10/14/01	—	—	— / —	—	—	—	—	— / —	AC
	154	SALC-21	1	1139	10/19/01	0658	-25.5	2.6 / 3.0	10/20/01	0645	-5.7	2.8	F / F	JRR / JRR

MFM Used # 5379

Weather Codes: K = Clear, P = Partly Cloudy, C = Cloudy, F = Foggy, & R = Raining.

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SAMPLE FIELD LOG SHEET FOR CANISTERS

Project # P-01-004

Ambient Monitoring for MeBr/Telone in Monterey and Santa Cruz Counties

Sample Log Number	Sample Name	Sampler ID Number	Silco Canister Number	Sample Start				Sample Stop				Comments Including Weather Status	Sampler's Initials
				Date	Time (PST)	Guage ("Hg)	Flowrate Initial / Start	Date	Time (PST)	Guage ("Hg)	Flowrate (sccm)	Start / Stop	Start / Stop
155	SALC-21ES	17	1107	10/19/01	0704	-26.0	3.4 / 3.0	10/20/01	0651	-6.5	2.6	F / F	JRR / JRR
156	CHLC-21	14	1154	10/19/01	0754	-30.0	2.7 / 3.0	10/20/01	0808	-8.2	2.7	F / P	JRR / JRR
157	LJEC-21	7	1055	10/19/01	0848	-28.0	2.9 / 3.0	10/20/01	0911	-4.5	2.9	P / P	JRR / JRR
158	PM SESC-21	8	1156	10/19/01	0941	-29.2	2.8 / 3.0	10/20/01	1013	-5.3	2.4	C / P	JRR / JRR
159	MESC-21	5	1090	10/19/01	1023	-30.0	3.1 / 3.0	10/20/01	1113	-4.5	2.5	C / P	JRR / JRR
160	SESC-21	10	1061	10/19/01	1106	-28.0	3.1 / 3.0	10/20/01	1204	-2.5	2.8	C / P	JRR / JRR
161	SALC-21TS	—	1137	10/19/01	1401	—	— / —	—	—	—	—	C / —	JRR / —
162	SALC-21TB	—	1097	10/19/01	1404	—	— / —	—	—	—	—	C / —	JRR / —
163	SALC-22	1	1108	10/20/01	0648	-25.8	2.9 / 3.0	10/21/01	0637	-5.5	2.9	F / C	JRR / JRR
164	CHLC-22	14	1069	10/20/01	0811	<-30	2.8 / 3.0	10/21/01	0759	-17	4.3	P 2.2 max flow w. 200 cm / C	JRR / JRR
165	LJEC-22	7	1057	10/20/01	0913	-28.0	2.9 / 3.0	10/21/01	0906	-3.5	3.1	P / C	JRR / JRR
166	PMSC-22	8	1141	10/20/01	1016	-29.5	2.9 / 3.0	10/21/01	1005	-5.5	2.8	P / C	JRR / JRR
167	MESC-22	5	1125	10/20/01	1115	<-30	2.9 / 3.0	10/21/01	1058	-6.5	3.2	P Sensitivity to adjust / C	JRR / JRR
168	SESC-22	10	1065	10/20/01	1206	-28.5	/ 3.0	10/21/01	1146	-3.5	3.1	P / C	JRR / JRR
169	SALC-23	1	1183	10/21/01	0640	-26.0	/ 3.0	10/22/01	0620	-5.5	2.9	C / C	JRR / JRR
170	SALC-23C	17	1050	10/21/01	0643	-28.5	3.4 / 3.0	10/22/01	0626	-7.8	2.8	C / C	JRR / JRR
171	CHLC-23	9	1060	10/21/01	0810	<-30	/ 3.0	10/22/01	0735	-6.5	3.2	C / C	JRR / JRR
172	CHLC-23C	11	1063	10/21/01	0813	-28.5	2.9 / 3.0	10/22/01	0741	-6.2	2.9	C / C	JRR / JRR
173	LJEC-23	7	1179	10/21/01	0905	-27.5	/ 3.0	10/22/01	0844	-4	3.0	C / C	JRR / JRR
174	LJEC-23C	15	1092	10/21/01	0912	-29.5	2.7 / 3.0	10/22/01	0848	-6.5	2.9	C / C	JRR / JRR
175	PMSC-23	8	1181	10/21/01	1007	-29.0	3.1 / 3.0	10/22/01	0938	-6.0	3.0	C / C	JRR / JRR
176	PMSC-23C	4	1070	10/21/01	1010	<-30	2.9 / 3.0	10/22/01	0943	-7.0	3.1	C / C	JRR / JRR

MFM Used # * 5400

Weather Codes: K = Clear, P = Partly Cloudy, C = Cloudy, F = Foggy, & R = Raining.

SAMPLE FIELD LOG SHEET FOR CANISTERS

Project # P-01-004

Ambient Monitoring for MeBr/Telone in Monterey and Santa Cruz Counties

* FLAGGED

Sample Log Number	Sample Name	Sampler ID Number	Silco Canister Number	Sample Start				Sample Stop				Comments Including Weather Status	Sampler's Initials
				Date	Time (PST)	Guage ("Hg)	Flowrate Initial / Start	Date	Time (PST)	Guage ("Hg)	Flowrate (sccm)	Start / Stop	Start / Stop
177	MESC-23	5	1147	10/21/01	1102	<-30	3.1 / 3.0	10/22/01	1026	-7.0	3.0	C / P	JRR / JRR
178	MESC-23C	2	1064	10/21/01	1105	-30.0	2.9 / 3.0	10/22/01	1032	-6.0	3.0	C / P	JRR / JRR
179	SESC-23	10	1103	10/21/01	1149	-28.0	/ 3.0	10/22/01	1115	-3.5	3.1	C / K	JRR / JRR
180	SESC-23C	6	1078	10/21/01	1153	-28.0	2.6 / 3.0	10/22/01	1123	-4.8	2.8	C Sensitive to adjust / K	JRR / JRR
181	SALC-24	1	1165	10/22/01	0623	-26.0	2.9 / 3.0	10/23/01	0639	-5.2	2.8	C / F	JRR / JRR
182	CHUC-24	9	1158	10/22/01	0738	<-30	3.1 / 3.0	10/23/01	0726	-7.5	3.0	C / K	JRR / JRR
183	LJEC-24	7	1066	10/22/01	0846	-27.5	/ 3.0	10/23/01	0813	-4.5	2.9	C / F	JRR / JRR
184	PMSC-24	8	1123	10/22/01	0941	-28.8	/ 3.0	10/23/01	0855	-6.0	3.0	C / F	JRR / JRR
185	MESC-24	5	1099	10/22/01	1028	<-30	2.9 / 3.0	10/23/01	0931	-7.5	2.9	P / P	JRR / JRR
186	SESC-24	10	1196	10/22/01	1117	-28.5	/ 3.0	10/23/01	1018	-4.5	2.8	K / K	JRR / JRR
187	SALC-25	1	1150	10/27/01	0712	-26.0	3.1 / 3.0	10/28/01	0654	-6.0	2.8	C / P	JW / JW
188	CHUC-25	9	1111	10/27/01	0804	<-30	2.9 / 3.0	10/28/01	0800	-4.0	3.0	C / P	JW / JW
189	LJEC-25	7	1134	10/27/01	0856	-27.5	3.1 / 3.0	10/28/01	0855	-4.0	2.8	P / P	JW / JW
190	PMSC-25	8	1087	10/27/01	0953	-29.4	3.0 / 3.0	10/28/01	1001	-5.8	2.7	P / P	JW / JW
191	MESC-25	5	1133	10/27/01	1035	<-30	3.0 / 3.0	10/28/01	1049	11.5	2.3	P / P	JW / JW
192	SESC-25	10	1102	10/27/01	1123	-28.0	3.0 / 3.0	10/28/01	1136	-3.0	3.0	P / P	JW / JW
193	SALC-26	1	1169	10/28/01	0656	-26.0	2.8 / 3.0	10/29/01	0659	-5.0	3.0	P / C	JW / JW
194	CHUC-26	9	1182	10/28/01	0804	<-30	3.0 / 3.0	10/29/01	0806	-7.0	3.1	P / C	JW / JW
195	LJEC-26	7	1149	10/28/01	0858	-28.0	2.8 / 3.0	10/29/01	0907	-3.8	3.0	P / C	JW / JW
196	PMSC-26	8	1172	10/28/01	1004	-29.5	2.8 / 3.0	10/29/01	1016	-5.0	2.4	P / C	JW / JW
197	MESC-26	5	1129	10/28/01	1053	<-30	2.3 / 3.0	10/29/01	1100	-6.8	2.3	P / C	JW / JW
198	SESC-26	10	1173	10/28/01	1140	-28.0	3.0 / 3.0	10/29/01	1145	0	2.0	P	JW / JW

MFM Used # 5400

Weather Codes: K = Clear, P = Partly Cloudy, C = Cloudy, F = Foggy, & R = Raining.

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SAMPLE FIELD LOG SHEET FOR CANISTERS

Project # P-01-004

Ambient Monitoring for MeBr in the City of Santa Cruz

* Controller full of → (#5) water - blew out line - put on #14, checks ok

Sample Log Number	Sample Name	Sampler ID Number	Silco Canister Number	Sample Start				Sample Stop				Comments Including Weather Status	Sampler's Initials
				Date	Time (PST)	Guage ("Hg)	Flowrate Initial / Start	Date	Time (PST)	Guage ("Hg)	Flowrate (sccm)	Start / Stop	Start / Stop
199	SALC-27 TB	–	1067	10/29/01	0645	–	– / –	–	–	–	–	C / –	JW / –
200	SALC-27	1	1086	10/29/01	0701	-26.0	3.0 / 3.0	10/30/01	0652	-5	2.9	C / R	JW / JW
201	SALC-27C	17	1072	10/29/01	0705	-28.0	3.0 / 3.0	10/30/01	0653	-7	2.9	C / R	JW / JW
202	CHUC-27	9	1130	10/29/01	0808	<-30	2.9 / 3.0	10/30/01	0757	-7.8	3.0	C / R	JW / JW
203	CHUC-27C	11	1140	10/29/01	0813	-28.0	3.0 / 3.0	10/30/01	0758	-4.2	2.7	C / R	JW / JW
204	LJEC-27	7	1053	10/29/01	0909	-28.0	2.9 / 3.0	10/30/01	0902	-3.0	2.9	C / R	JW / JW
205	LJEC-27C	15	1091	10/29/01	0915	-29.5	3.0 / 3.0	10/30/01	0903	-5.0	2.9	C / R	JW / JW
206	PMSC-27	8	1132	10/29/01	1019	-29.0	3.0 / 3.0	10/30/01	1012	-5.5	2.8	C / R	JW / JW
207	PMSC-27C	4	1042	10/29/01	1022	<-30	3.0 / 3.0	10/30/01	1013	-8.5	2.7	C / R	JW / JW
208	MESC-27	5	1180	10/29/01	1104	<-30	3.0 / 3.0	10/30/01	1107	-7.5	2.5	C / R	JW / JW
209	MESC-27C	2	1076	10/29/01	1107	-30	2.9 / 3.0	10/30/01	1108	-5.0	2.9	C / R	JW / JW
210	SESC-27	10	1164	10/29/01	1149	-28	3.0 / 3.0	10/30/01	1154	-3.0	2.7	P / R	JW / JW
211	SESC-27C	6	1160	10/29/01	1153	-27.6	3.0 / 3.0	10/30/01	1155	-4.0	3.0	P / R	JW / JW
212	SALC-28	1	1153	10/30/01	0656	-26.0	3.0 / 3.0	10/31/01	0701	-4.5	3.0	R / K	JW / JW
213	CHUC-28	9	1074	10/30/01	0802	<-30	3.0 / 3.0	10/31/01	0743	-5.0	2.9	R / K	JW / JW
214	LJEC-28	7	1128	10/30/01	0906	-27	2.9 / 2.9	10/31/01	0841	-4.4	2.9	R / K	JW / JW
215	PMSC-28	8	1058	10/30/01	1015	-29	2.8 / 2.9	10/31/01	0936	-6.3	2.9	R / K	JW / JW
216	MESC-28	5	1088	10/30/01	1111	<-30	3.1 / 3.0	10/31/01	1030	-29.5	0	R / K	JW / JW *
217	SESC-28	10	1052	10/30/01	1158	-27	3.2 / 3.0	10/31/01	1110	-5.8	2.7	R / K	JW / JW ①
218	SALC-29	1	1159	11/4/01	0635	-26.0	3.2 / 3.0	11/5/01	0625	-5.0	2.8	K / F	ogl / ogl
219	CHUC-29	11	1100	11/4/01	0732	-28.5	3.0 / 3.0	11/5/01	0750	-5.5	2.9	K / F	ogl / ogl
220	LJEC-29	7	1143	11/4/01	0833	-28.0	2.9 / 3.0	11/5/01	0901	-2.5	3.0	K / OC	ogl / ogl

MFM Used # 5400

Weather Codes: K = Clear, P = Partly Cloudy, C = Cloudy, F = Foggy, & R = Raining.

OC - OVERCAST

① HELICOPTER SPRAYING 300m north (WIND FROM EAST)

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SAMPLE FIELD LOG SHEET FOR CANISTERS

Project # P-01-004

Ambient Monitoring for MeBr/Telone in Monterey and Santa Cruz Counties

Sample Log Number	Sample Name	Sampler ID Number	Silco Canister Number	Sample Start				Sample Stop				Comments Including Weather Status	Sampler's Initials
				Date	Time (PST)	Guage ("Hg)	Flowrate Initial / Start	Date	Time (PST)	Guage ("Hg)	Flowrate (sccm)	Start / Stop	Start / Stop
221	PMSC-29	8	1098	11/4/01	0935	-29.5	3.0 / 3.0	11/5/01	1021	-5.0	2.3	K / K	cap / cap
222	MESC-29	2	1152	11/4/01	1046	<-30.0	2.8 / 3.0	11/5/01	1132	-7.0	0	K / K	cap / cap
223	SESC-29	10	1186	11/4/01	1125	-30.0	2.6 / 3.0	11/5/01	1227	-0.5	1.9	K / K	cap / cap
224	SALC-29	1	1179	11/5/01	0629	-26.0	2.9 / 3.0	11/6/01	0616	-5.0	2.9	F / OC	cap / cap
225	SALC-30FS	17	1050	11/5/01	0633	-27.0	3.2 / 3.0	11/6/01	0621	-7.0	2.7	F / OC	cap / cap
226	SALC-30TS	—	1139	11/5/01	0633	—	— / —	—	—	—	—	F / —	cap / cap
227	SALC-30TB	—	1124	11/5/01	0633	—	— / —	—	—	—	—	F / —	cap / cap
228	CHUC-30	9	1138	11/5/01	0755	<-30.0	2.6 / 3.0	11/6/01	0724	-7.5	3.1	F / P	cap / cap
229	LJEC-30	7	1142	11/5/01	0905	-28.0	3.0 / 3.0	11/6/01	0827	-4.0	3.1	OC / OC	cap / cap
230	PMSC-30	8	1089	11/5/01	1026	-29.0	3.0 / 3.0	11/6/01	0931	-6.0	3.0	K / OC	cap / cap
231	MESC-30	14	1062	11/5/01	1128	-30.0	3.0 / 3.0	11/6/01	1039	-8.0	3.0	K / OC	cap / cap
232	SESC-30	10	1127	11/5/01	1230	-28.0	3.0 / 3.0	11/6/01	1202	-2.0	2.8	K / OC	cap / cap
233	SALC-31	1	1097	11/6/01	0619	-26.0	3.0 / 3.0	11/7/01	0612	-4.5	2.9	OC / P	cap / cap
234	SALC-31C	17	1069	11/6/01	0626	-27.5	2.8 / 3.0	11/7/01	0608	-5.5	2.8	OC / P	cap / cap
235	CHUC-31	9	1170	11/6/01	0727	<-30.0	2.9 / 3.0	11/7/01	0708	-4.0	3.4	P / F	cap / cap
236	CHUC-31C	11	1084	11/6/01	0730	-29.0	2.7 / 3.0	11/7/01	0705	-4.5	2.9	P / F	cap / cap
237	LJEC-31 ~~CHU~~	7	1136	11/6/01	0832	-27.5	3.0 / 3.0	11/7/01	0826	-3.5	3.0	OC / K	cap / cap
238	LJEC-31C	15	1102	11/6/01	0835	-29.0	3.0 / 3.0	11/7/01	0824	-6.0	2.9	OC / K	cap / cap
239	PMSC-31	8	1104	11/6/01	0934	-29.0	3.0 / 3.0	11/7/01	0934	-5.5	2.3	OC / K	cap / cap
240	PMSC-31C	4	1183	11/6/01	0937	-30.5	2.8 / 3.0	11/7/01	0931	-10.0	2.8	OC / K	cap / cap
241	MESC-31	14	1135	11/6/01	1042	<-30.0	3.0 / 3.0	11/7/01	1050	-5.5	2.5	OC / K	cap / cap
242	SESC-31	10	1146	11/6/01	1205	-27.5	3.3 / 3.0	11/7/01	1143	-3.0	2.4	OC / K	cap / cap

MFM Used # 5400

Weather Codes: K = Clear, P = Partly Cloudy, C = Cloudy, F = Foggy, & R = Raining.

SAMPLE FIELD LOG SHEET FOR CANISTERS

Project # P-01-004

Ambient Monitoring for MeBr/Telone in Monterey and Santa Cruz Counties

Sample Log Number	Sample Name	Sampler ID Number	Silco Canister Number	Sample Start				Sample Stop				Comments Including Weather Status	Sampler's Initials
				Date	Time (PST)	Guage ("Hg)	Flowrate Initial / Start	Date	Time (PST)	Guage ("Hg)	Flowrate (sccm)	Start / Stop	Start / Stop
243	SESC-31C	6	1125	11/6/01	1212	-27.0	3.0 / 3.0	11/7/01	1136	-4.5	2.7	OC / K	cgp / cgp
244	SALC-32	1	1178	11/7/01	0614	-26.0	3.0 / 3.0	11/8/01	0607	-5.0	2.8	P / K	cgp / cgp
245	CHUC-32	9	1187	11/7/01	0711	-30.0	3.2 / 3.0	11/8/01	0653	-7.5	2.9	F / K	cgp / cgp
246	LJEC-32	7	1083	11/7/01	0830	-27.0	2.9 / 3.0	11/8/01	0739	-4.0	3.0	K / K	cgp / cgp
247	PMSC-32	8	1161	11/7/01	0938	-30.0	2.9 / 3.0	11/8/01	0839	-6.0	2.5	K / K	cgp / cgp
248	MESC-32	14	1184	11/7/01	1052	-29.5	2.9 / 3.0	11/8/01	0952	-5.0	2.3	K / K	cgp / cgp
249	MESC-32C	17	1131	11/7/01	1045	-28.5	2.8 / 3.0	11/8/01	0954	"0"	0	K / K	cgp / cgp
250	SESC-32	10	1056	11/7/01	1147	-29.0	2.8 / 3.0	11/8/01	1047	-4.0	2.8	K / K	cgp / cgp

MFM Used # 5400

Weather Codes: K = Clear, P = Partly Cloudy, C = Cloudy, F = Foggy, & R = Raining.

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